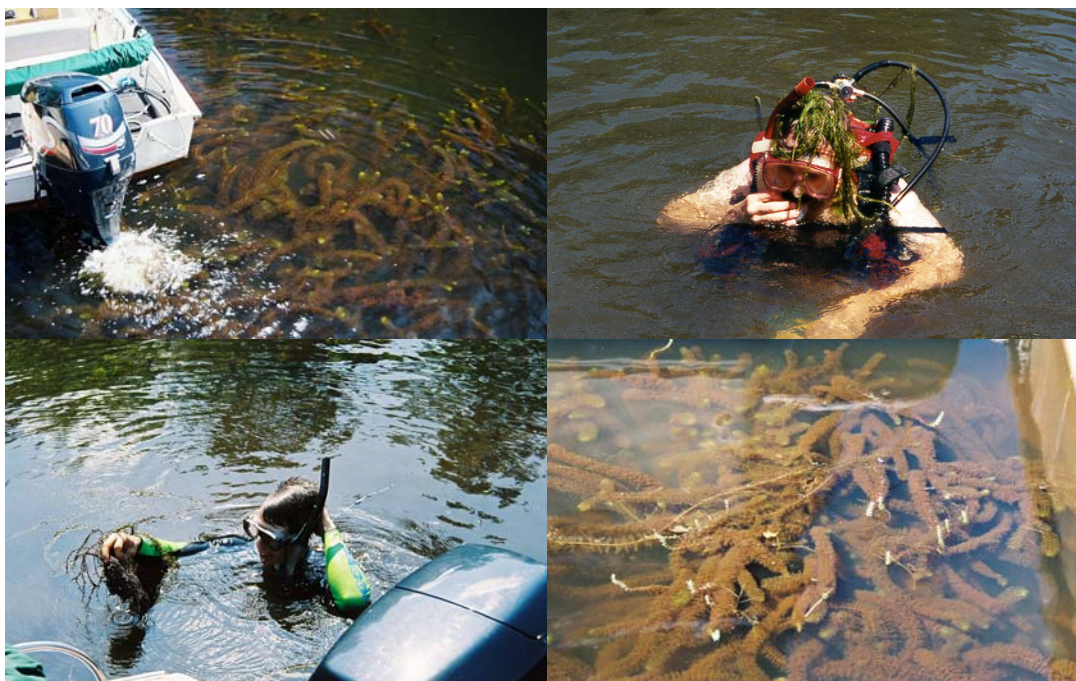


Report of the New Hampshire Exotic Aquatic Species Program



2004-2005



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Executive Summary

This report summarizes the spread and distribution of exotic aquatic species in New Hampshire and the activities of New Hampshire's Exotic Aquatic Plant Program to control these species. Program history is summarized, and activities that occurred from 2004 through 2005 are described in detail.

"Exotic aquatic species" are plants or animals that are not part of New Hampshire's native aquatic flora and fauna. Since the first exotic aquatic plant infestation in New Hampshire was discovered in 1965 in Lake Winnepesaukee, exotic aquatic plant infestations have increased to a total of 71 infestations in 65 waterbodies in 2005. Species present include variable milfoil (57 waterbodies), Eurasian milfoil (3 waterbodies), fanwort (9 waterbodies), water chestnut (1 waterbody) and Brazilian elodea (1 waterbody). Most of these exotic plants can propagate by fragmentation as well as by seed.

Exotic aquatic plant fragments can easily become attached to aquatic recreational equipment, such as boats, motors, and trailers, and can spread from waterbody to waterbody through transient boating activities. Infestations can have detrimental effects on the ecological, recreational, aesthetic, and economic values of the state's precious surface waters, limiting use of the waterbodies and decreasing shorefront property values by as much as 10-20% according to a UNH study (Halstead, et al., 2001).

Since its inception in 1981 with the passage of RSA 487:15, the Exotic Aquatic Plant Program has grown to become a cooperative effort among state agencies, lake organizations, and concerned citizens. At the state level, this involves a partnership among the New Hampshire Department of Environmental Services (DES), the Fish and Game Department, the Department of Safety, and the Department of Agriculture, Markets, and Foods to prevent the spread of exotic plants to new waterbodies and to monitor and treat infestations. Many lake associations and other non-profit organizations, such as the New Hampshire Lakes Association and individual lakes associations, participate in monitoring, education, and control efforts.

Recent Program Activities

Program activities include five focus areas: 1) Prevention of new infestations through education and outreach; 2) monitoring for early detection of new infestations; 3) control of new and established infestations; 4) research towards new control methods; and 5) regional/national cooperation with other exotic species programs.

Education, Outreach, and Prevention: Between 2004 and 2005, 110 presentations and seminars were given to lake associations and professional organizations, and several live radio broadcasts and local news media events were also conducted. The program coordinator also participated in a local television broadcast for shows focusing on aquatic ecology. The Exotic Species Program was also highlighted twice on "The Exchange" which is a segment on New Hampshire Public Radio.

Monitoring for Early Detection: Between 2004 and 2005, monitoring activities included macrophyte surveys by DES staff of 80 lakes. The Weed Watcher Program, coordinated by DES, recruits volunteers to monitor their waterbodies and to report suspicious plants to DES for immediate identification. In 2005, there were over 400 Weed Watchers monitoring over

100 waterbodies for early detection of exotics.

Control Activities for New and Existing Infestations: Control activities increased from 32 individual projects in 2004, to 35 in 2005. Control measures for new, small infestations include hand pulling or benthic barriers, and may include designation of a Restricted Use Area in the vicinity of the infestation. Larger, established infestations are usually controlled with herbicides. Project activities for 2004 included 13 herbicide applications, 4 benthic barrier installations, 10 hand-pulling activities, 5 Restricted Use Area designations, and 1 harvesting experiment. Project activities for 2005 included 18 herbicide applications, 4 benthic barrier installations, 7 hand-pulling activities, the establishment of 5 Restricted Use Areas, and 1 harvesting experiment.

Research: Initiating and participating in research activities is a key element in the Exotic Aquatic Plant Program. As variable milfoil is not a common nuisance species throughout the United States, little research has been conducted on the plant's biology, ecological relationships, and potential control strategies. By working with local academic institutions, such as the University of New Hampshire, as well as consultants and federal researchers, DES is coordinating the field-testing of various hypotheses on New Hampshire waterbodies. DES is working towards finding solutions to exotic aquatic plant infestations. DES also stays informed about what other states are doing to manage exotic aquatic species, as well as about emerging technologies in the field of management.

Regional Cooperation: DES has worked on a regional level to standardize the key legislation and education initiatives between the New England states. To date, New Hampshire, Vermont, Connecticut, and Maine have state exotic species legislation in place. Prohibition of exotic species sale and transport is much more effective on a regional basis than state-by-state. If a standardized list of exotic plants can be prohibited in New England and neighboring states, the likelihood of success in preventing the spread of these species to new waterbodies is increased.

The DES Exotic Aquatic Plant Program was funded from a fee of \$1.50 per boat registration until January 1, 2003. Passage of new legislation increased the revenue to \$4.50 per boat registration. The additional \$3 is used to fund the Milfoil and Other Exotic Aquatic Plant Prevention and Research Grant Fund. Monies from the \$1.50 fee are used to fund herbicide applications, educational materials, and administrative costs.

Long Term Goals

The goals of the Exotic Aquatic Plant Program are to limit the further spread of exotic aquatic species, control new and existing infestations, and to research new ways to contain or limit the spread of these species. Objectives in the five focus areas are:

Education and Outreach: Foster increased partnerships among public and private lake associations, state agencies, regional groups, and other aquatic interests to provide and disseminate innovative and proactive educational materials that inform the public about exotic aquatic species, how they are spread, and how they are controlled.

Monitoring for Early Detection: Expand the Weed Watcher Program and coordinate training activities with volunteer monitors. Map infestations using global positioning systems to

more accurately document and track the occurrence and distribution of infestations over time. Develop DNA gene sequencing methods for positive identification of variable milfoil during all life stages.

Control Activities for New and Existing Infestations: Develop a streamlined process, including appropriate monitoring and environmental assessment, for conducting herbicide applications.

Research: Conduct research on long-term control methods and potential means for eradication of exotic aquatic plants. DES will work to develop DNA gene sequencing methods for positive identification of variable milfoil during all life stages. DES plans to continue working with the University of New Hampshire and other research entities to further our knowledge and control options.

Regional Cooperation: Continue to develop regional approaches for the northeastern states for education, outreach and monitoring.

Looking to 2006 and beyond, DES would like to promote programs that meet the challenge of preventing new exotics infestations, controlling existing ones, and researching new techniques for control and even eradication of exotic aquatic species.

In its 2006 session, the New Hampshire General Court is also considering several pieces of legislation that propose to remove the sunset provision from the research and prevention grants, and to find alternative additional sources of funding for control activities.

1. PROGRAM OVERVIEW

1.1 Purpose and Overview

This report describes activities of New Hampshire's Exotic Aquatic Plant Program during 2004 and 2005. It also summarizes the spread and distribution of exotic aquatic plants in New Hampshire and the program history.

The primary purpose of New Hampshire's Exotic Aquatic Plant Program is to "prevent the introduction and further dispersal of exotic aquatic weeds and to manage or eradicate exotic aquatic weed infestations in the surface waters of the state" (RSA 487:17, II). The program focuses on submerged exotic aquatic plants, including variable milfoil (*Myriophyllum heterophyllum*), Eurasian milfoil (*Myriophyllum spicatum*), fanwort (*Cabomba caroliniana*), Brazilian elodea (*Egeria densa*), Hydrilla (*Hydrilla verticillata*) and water chestnut (*Trapa natans*), among other species (reference Env-Ws 1303.01 in Appendix 1 for full list). Other exotic plants, such as common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*), although also of concern, are not addressed by the Program because they are not submerged aquatic plants, and are generally found more often in wetlands than in lakes or ponds.

The program, initiated in 1981, has five focus areas: 1) Prevention of new infestations, 2) Monitoring for early detection of new infestations to facilitate rapid control activities, 3) Control of new and established infestations, 4) Research towards new control methods with the goal of reducing or eliminating infested areas, and 5) Regional cooperation. The program is funded through a \$5 fee derived from New Hampshire boat registrations. Of that \$5 fee, a total of \$4.50 is dedicated to tasks and projects associated with exotic aquatic plants. Details on revenues and expenditures can be found in Section 3.

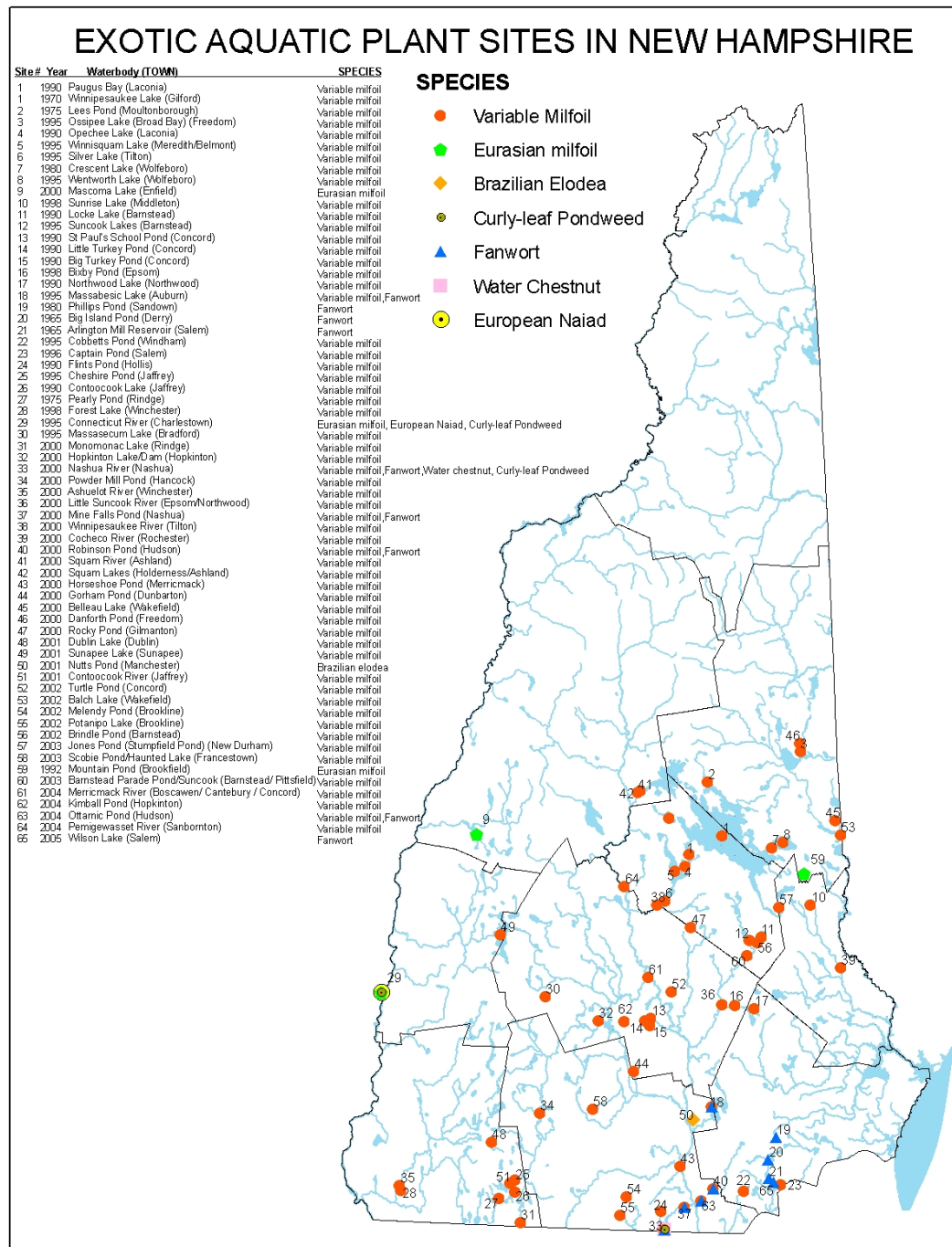
1.2 The Problem

"Exotic aquatic plants" are plants living in lakes, rivers, or other waterbodies that are not part of New Hampshire's native aquatic flora. These plants, sometimes called 'nuisance' or 'invasive' species, or 'weeds' (and in the enacting legislation "exotic aquatic weeds") can grow and reproduce rapidly, taking over large portions of waterbodies and impairing boating, recreation, and aesthetics, threatening native plant species and causing habitat loss. A study by the University of New Hampshire has documented 10-20% declines in lakefront property values attributed to the presence of exotic aquatic plants (Halstead et al., 2001).

Exotic aquatic plants propagate primarily by fragmentation, a process by which a stem broken from a mature plant can grow roots, settle in a new location, and begin growth of a new plant. Plant fragments, most often generated by human activity, can easily become entangled on boats, trailers, fishing equipment, or diving gear, thus spreading from waterbody to waterbody. Recreational boat registrations in New Hampshire have grown over 20% since 1997, to include more than 101,000 boats registered in 2005. With the increase in boating activities, there is increased potential for the spread of exotic aquatic plants to new locations and waterbodies by boats and other water-related recreational equipment.

The first exotic aquatic plant infestation in New Hampshire was discovered in 1965 in Lake Winnepesaukee. Since then, infestations have increased to a total of 74 infestations on 65 waterbodies in 2005 (Figure 1-1).

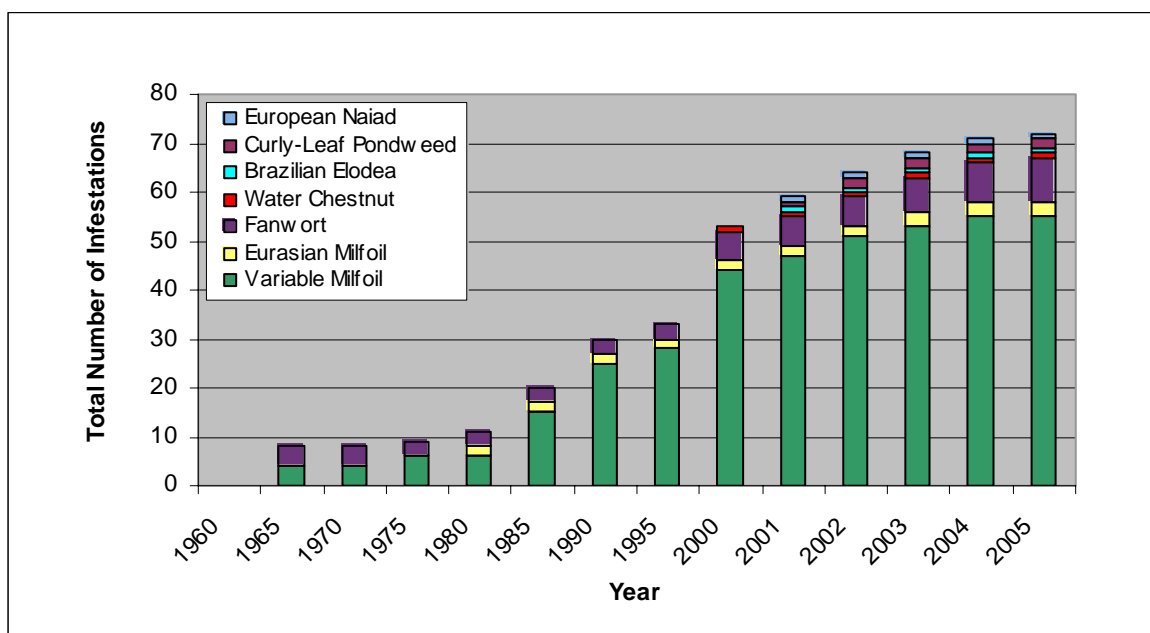
Figure 1-1
Exotic Plant Infestations as of Fall 2005



Four fanwort infestations were documented in the 1960s, but a dredge of Milville Lake during the early 1980s led to its eradication, leaving only three infestations. Other fanwort populations were documented in the Nashua River and Mine Falls Pond, Nashua, and in Robinson Pond, Hudson, in the late 1990s, and in Lake Massabesic in 2003. Fanwort infestations were also documented in 2004 in Otternic Pond, Hudson, and in Wilson Lake, Salem in 2005, bringing the total in 2005 to nine infestations. Water chestnut, first found in New Hampshire in 1998, is currently documented only in the Nashua River. During the summer of 2001, the first New Hampshire infestation of Brazilian elodea (*Egeria densa*) was identified in Nutts Pond, Manchester.

Six waterbodies now have more than one species of exotic aquatic plants: Mine Falls Pond, Nashua (milfoil and fanwort), Robinson Pond and Otternic Pond, Hudson (milfoil and fanwort), Lake Massabesic, Auburn (milfoil and fanwort), the Nashua River, Nashua (milfoil, fanwort, curly-leaf pondweed and water chestnut), and the Connecticut River south of Hanover (Eurasian water milfoil, two exotic water naiads, and curly-leaf pondweed). Figure 1-2 depicts the trend of exotic aquatic plant infestations by species from 1960-2005.

Figure 1-2
Annual Trends in Total Documented Exotic Aquatic Plant Infestations



3 History

Activities associated with the control of exotic aquatic plants formally began in 1981 with the passage of an exotic plant control law, RSA 487:15. In 1998, RSA 487:16-a was adopted, establishing the current legislative basis for the Exotic Aquatic Plant Program. In September of 1999, Chapter Env-Ws 1300 was adopted, further defining the provisions of the exotic aquatic plant program, and listing 14 aquatic plants as prohibited in New Hampshire. Copies of the program legislation and regulations are included in Appendix 1. Table 1-1 provides a summary of key events and activities that have occurred from the beginning of the program.

Table 1-1
Key Events in the Exotic Aquatic Plant Program: 1981-2005

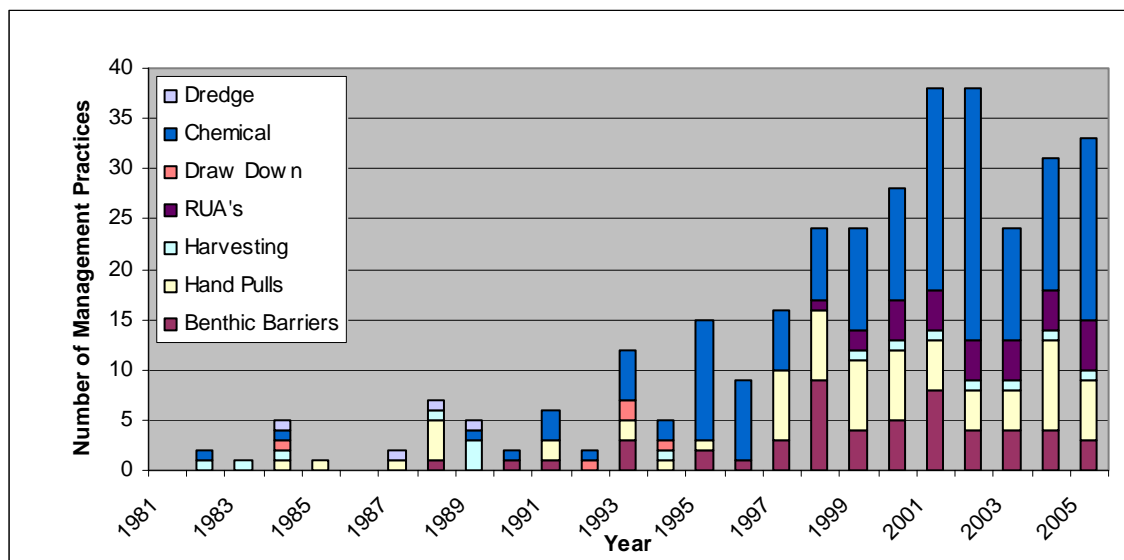
Year	Activity/Event
1981	➤ Exotic Weed Legislation (RSA 149-F:3) enacted
1982	➤ Citizen Aquatic Weed Control Advisory Committee formed by a group of volunteers
1984	➤ Milville Lake dredged to control a fanwort infestation
1985	➤ Exotic plant control funding suspended due to changes in legislation. No control techniques employed this year
1986	➤ Exotic plant control funding became available once again due to legislative action
1987	➤ \$45,000 grant awarded to the Aquatic Biology Department at the University of New Hampshire, Durham to conduct a literature search to determine adequate control techniques for exotic aquatic plants
1988	➤ Weed Watcher Program initiated
1991	<ul style="list-style-type: none"> ➤ Discovery of larval form of <i>Paraponyx allionealis</i> (an aquatic moth) on <i>Myriophyllum heterophyllum</i> (variable milfoil) in Lees Pond, Moultonboro, which led to research on the possible use of this organism as a biological control for milfoil. The insect was not specific to milfoil, so it is not a good biological control option. ➤ Exotic aquatic plants sign developed for posting at public access sites
1992	➤ First infestation of <i>Myriophyllum spicatum</i> (Eurasian milfoil) discovered in Mountain Pond, Brookfield, New Hampshire
1993	<ul style="list-style-type: none"> ➤ First aquatic plant workshop held at DES for lake association members and volunteers ➤ Presentation on exotic plants given to BASS Master Associations
1995	➤ Weed Watcher Wheel developed for use in identification of exotic plants
1996	➤ Exotic plant identification workshop held for Fish and Game Department
1998	<ul style="list-style-type: none"> ➤ RSA 487:16-a became effective on January 1, 1998, increasing funding for the Exotic Species Program. ➤ Env-Ws 1300 Exotic Weed Control Rules adopted on September 5, 1998. Fourteen species of exotic aquatic plants listed as prohibited plants in rules ➤ A mailing to 700 aquatic plant retailers in New Hampshire conducted to inform them of prohibitions associated with 14 listed exotic aquatic plants ➤ First Restricted Use Area (RUA) established on Lake Massasecum, Bradford ➤ <i>Trapa natans</i> (water chestnut) found in Nashua River, Nashua
1999	➤ <i>Myriophyllum spicatum</i> (Eurasian milfoil) first identified in Lake Mascoma, Enfield
2000	➤ RSA 487:16-b relative to exotic aquatic plant penalties adopted
2001	<ul style="list-style-type: none"> ➤ Amendment to Env-Ws 1304.01(a) passed to modify provisions for the use of Restricted Use Areas on waterbodies with limited infestations of exotic aquatic plants ➤ First infestation of <i>Egeria densa</i> (Brazilian elodea) found in New Hampshire in Nutts Pond, Manchester ➤ Restricted Use Areas installed in Lake Sunapee and Squam Lake

Year	Activity/Event
2002	<ul style="list-style-type: none"> ➤ Significant expansion of Weed Watcher Program ➤ Pilot Lake Host Program Launched by New Hampshire Lakes Association
2003	<ul style="list-style-type: none"> ➤ RSA 487:23 became effective, establishing the Milfoil Prevention and Research Grant Program ➤ First round of Milfoil Prevention Grants awarded to three applicants. Lake Host Program received state funding to staff 37 public access sites. Sixteen boats with milfoil detected and cleaned, preventing new infestations
2004	<ul style="list-style-type: none"> ➤ New infestations of variable milfoil were documented in the Merrimack River in Penacook, Kimball Pond in Hopkinton, and the Pemigewasset River in Sanbornton. Fanwort was newly documented in Otternic Pond in Hudson. ➤ The Department of Environmental Services was the recipient of a \$1 million federal appropriation to conduct research on variable milfoil. DES funded 6 projects with this funding. ➤ The Exotic Aquatic Weeds and Species Committee was enacted by RSA-487:30 to evaluate the Exotic Aquatic Plant Program, and work on legislation to expand the scope and funding of the program.
2005	<ul style="list-style-type: none"> ➤ No new milfoil infestations this year. One new fanwort infestation was documented in Wilson Lake in North Salem. Lake Host Program continues to grow to cover 61 public access sites, and 54 boats with milfoil detected and cleaned, preventing new infestations.

A more complete chronology of program events and activities is provided in Appendix 2.

A variety of control projects have been conducted on lakes and ponds each year, with an increasing number of control projects conducted annually over the years. Figure 1-3 summarizes the historical trends in control practices since 1981.

Figure 1-3
Summary of Past Control Practices



1.4 Partnerships

The scope of the Exotic Aquatic Plant Program has grown over time as public awareness of exotic aquatic plants has grown with the number of infestations. The program employs a multi-faceted approach to control the spread of exotic aquatic plants. This has developed and evolved with increased partnerships among state agencies, local government, and volunteer groups. The shared expertise, capacity, and knowledge base of the program activities built through these partnerships are key elements to program success. Many agencies and groups participate in program activities, including the Fish and Game Department, the Department of Safety, the Department of Agriculture Markets and Foods, and the New Hampshire Lakes Association. The roles of the partner organizations are described in Table 1-2.

Table 1-2
Partner Organizations and Their Responsibilities

I. STATE AGENCIES
Department of Environmental Services (DES) <ul style="list-style-type: none"> Coordinates all aspects of the Exotic Aquatic Plant Program
Fish and Game Department (NHF&G) <ul style="list-style-type: none"> Conducts reviews of special aquatic permits for herbicide application to determine potential impacts to aquatic animal habitat Provides assistance in the designation and enforcement of restricted use areas on waterbodies Coordinates and performs education/outreach activities that include information on exotic species Displays aquatic plant signs at NHF&G owned boat launch facilities Collaborates with DES on the development and production of educational materials
Department of Safety (NHDOS) <ul style="list-style-type: none"> Provides assistance in the designation and enforcement of restricted use areas on waterbodies Collaborates with DES on the implementation of the Milfoil Prevention Grant Program Includes exotic plant awareness in boater safety instruction courses Ensures that all Marine Patrol officers are aware of exotic aquatic plant problems and know the protocols associated with inspecting their boats and trailers for attached plant fragments
Department of Agriculture, Markets and Food (NHDA) <ul style="list-style-type: none"> Permits and oversees the application of herbicide for control of nuisance exotic plants Provides technical information on aquatic herbicides
Department of Resources and Economic Development (NHDRED) <ul style="list-style-type: none"> Provides information on rare and endangered species in the event that an exotic aquatic plant may impact a threatened habitat
II. OTHER ORGANIZATIONS
Legislative Working Groups <ul style="list-style-type: none"> The Exotic Aquatic Weeds and Species Committee was enacted by RSA-487:30 to evaluate the Exotic Aquatic Plant Program, and work on legislation to expand the scope and funding of the program. The Exotic Aquatic Plant Program meets with the members of this committee quarterly to review the program and funding needs.
Municipalities <ul style="list-style-type: none"> Manchester Water Works performs a number of milfoil control activities on Lake Massabesic including installation of benthic barriers and designation of restricted use areas
University of New Hampshire, Durham <ul style="list-style-type: none"> Makes specimens in Hodgdon Herbarium available for verification of species Offers trained botanists' time to verify a species identification Provides outreach and education materials through the NH Lakes Lay Monitoring Program (NHLLMP) and Cooperative Extension
New Hampshire Lakes Association (NHLA) <ul style="list-style-type: none"> Works closely with individual Lake Associations Coordinates with DES for the implementation and funding for the Lake Host Program Works with DES to draft appropriate legislation that pertains to exotic aquatic plants
Marinas <ul style="list-style-type: none"> Provide information to boaters about exotic aquatic plants
Private Citizens <ul style="list-style-type: none"> Participate in NH Weed Watchers Program by frequently monitoring the littoral zone of waterbodies during the growing season Mail or deliver suspected exotic plants to DES for identification of species

2. ACTIVITIES: 2004-2005

The program has five focus areas: 1) Prevention of new infestations, 2) Monitoring for early detection of new infestations, 3) Control of new and established infestations, 4) Research towards new control methods with the goal of reducing or eliminating infested areas, and 5) Cooperation between regional and national groups. Activities in each focus area are discussed below. Funding for each of these activities is discussed in Section 3.

2.1 Prevention of New Infestations - Education and Outreach

Education and outreach activities are the key to prevention activities. Both regionally and nationally, efforts are under way to boost the level of information that is available to the general public about exotic aquatic plant species. The more individuals are aware of the problems associated with exotic aquatic plants, the lesser the likelihood the plants will continue to be spread throughout the state. Education and outreach initiatives are targeted towards the users of our surface waters (boaters, personal water craft users, fishermen, and others), special interest groups (fishermen, boater groups, seaplane groups), and aquarium and water garden hobbyists.

Outreach efforts are aimed at educating the public about the characteristics and control of exotic plants, including:

1. The negative environmental and economic impacts of exotic aquatic plants
2. Exotic aquatic plant identification
3. How exotic aquatic plants spread
4. How to minimize the spread
5. Control techniques
6. New Hampshire's Exotic Aquatic Plant laws and regulations

2.1.1 Presentations

From 2004 through 2005, the Exotic Aquatic Plant Program Coordinator and the Limnology Center Director gave 110 presentations on exotic aquatic plants. These presentations took place during annual lake association meetings, legislative committee meetings, municipal conservation commission meetings, lake management meetings, high school and college classes, and professional meetings.

The Exotic Aquatic Plant Program Coordinator attended annual lake festivals, conferences, and environmental awareness festivals throughout the state. At these events written materials were provided for distribution while the coordinator interacted on an individual basis with interested members of the public. Live specimens of exotic plants and look-alike native plants were also on display for close examination and comparison. Examples of fact sheets, pamphlets, and other materials provided at these presentations are presented in Appendix 3. Table 2-1 lists the groups and events that received presentations from 2004 through 2005.

Table 2-1
Presentations and Seminars Given in 2004-2005

Organization/ Event	Location	Year
Merrimack Board of Selectmen	Merrimack	2004
Farm and Forest Expo	Manchester	2004
Lakes Region Boat Show	Laconia	2004
New Hampshire Youth Earth Summit	Plymouth	2004
Monadnock High School Biology Classes	Swanzey	2004
University of New Hampshire, Lakes Management Class	Durham	2004
New Hampshire Water Council	Concord	2004
Lakes Management and Rivers Management Advisory Committees	Concord	2004
Marine Patrol- New Recruits	Concord	2004
Discover Wild New Hampshire Day	Concord	2004
Marine Patrol Auxiliary	Concord	2004
Connecticut Federation of Lakes	Connecticut	2004
Concord High School Biology II Classes	Concord	2004
Volunteer Lake Assessment Program Annual Refresher	Concord	2004
Lake Host Trainings (8 in all)	Concord	2004
Ossipee Lake Association	Ossipee	2004
Naturally Newfound	Bristol	2004
New England Chapter of NALMS Annual Meeting	Rhode Island	2004
Beaver Lake Association	Derry	2004
Pawtuckaway Lake Association	Nottingham	2004
New Hampshire Lakes Association Lakes Congress	Concord	2004
Sunset Lake Association	Hampstead	2004
Harvey Lake Association	Northwood	2004
Pleasant Pond Association	Fracestown	2004
Warren Lake Association	Alstead	2004
Granite Lake Association	Stoddard	2004
Upper Merrimack River Local Advisory Committee	Penacook	2004
Pine Island Pond Association	Manchester	2004
Lake Waukegan Watershed Association	Meredith	2004
Plymouth State Summer Science Institute	Plymouth	2004
Lovell Lake Association	Wakefield	2004
Horace Lake Association	Weare	2004
Merrymeeting Lake Association	New Durham	2004
Kezar Lake Association	Sutton	2004
Tom Pond Association	Warner	2004
Kolelemook Pond Weed Watchers	Springfield	2004
Eastman Lake Association	Grantham	2004
Lovell Lake Association	Wakefield	2004
Pea Porridge Pond Association	Madison	2004
Blaisdell Lake Association	Sutton	2004

Organization/ Event	Location	Year
Chocorua Lake Association	Chocorua	2004
New England Interstate Water Pollution Control Commissioner's Meeting	Vermont	2004
Suncook Lake Association	Barnstead	2004
Milfoil Study Committee Program Overview	Concord	2004
New Hampshire Technical Institute- Belknap Campus	Belknap	2004
New Hampshire Watershed Conference	Concord	2004
Peyton's Place TV Show (Representative Peyton Hinkle)	Merrimack	2004
Plymouth Freshwater Symposium	Plymouth	2004
Laconia Boat Show	Laconia	2004
Pawtuckaway Lake Association	Nottingham	2004
Eastman Lake Association	Grantham	2004
Suncook Lake Association	Barnstead	2004
Newfound Lake Day	Bristol	2004
Warren Lake Association	Alstead	2004
Granite Lake Association	Stoddard	2004
Highland Lake Association	Stoddard	2004
Pleasant Lake Association	Francestown	2004
Tom Pond Association	Warner	2004
Pea Porridge Pond Association	Madison	2004
Lees Pond Association	Moultonborough	2004
Angle Pond Association	Sandown	2004
Lake Winnisquam Association	Belmont	2004
Sanbornton Bay Association	Sanbornton	2004
Showell Pond Association	Sandown	2004
Colby Sawyer Biology Class	New London	2004
Northeast Aquatic Plant Management Society- Panel Discussion	Saratoga Springs, NY	2005
New England Water Works Association	Meredith	2005
Fish and Game Discover Wild NH Day	Concord	2005
Farm and Forest Expo	Manchester	2005
New England Invasive Plant Group	Massachusetts	2005
Nashua Conservation Commission	Nashua	2005
Marine Patrol New Recruits	Concord	2005
University of New Hampshire Lake Management Class	Durham	2005
Kimball Union Academy	Meriden	2005
Lake Ossipee Association	Ossipee	2005
Discover Wild New Hampshire Day	Concord	2005
Lake Host Trainings (8 in all)	Concord	2005
Volunteer Lake Assessment Program Annual Refresher Workshop	Concord	2005
Concord High School Biology II Classes	Concord	2005
New London Lakes Meeting	New London	2005

Organization/ Event	Location	Year
Alton Bay Milfoil Program	Alton	2005
New Hampshire Lakes Association Lakes Congress	Sunapee	2005
Beaver Lake Association	Derry	2005
Sand Pond Weed Watching Group	Marlow	2005
Canaan Street Lake Association	Canaan	2005
Pleasant Lake Association	Deerfield	2005
Pleasant Pond Association	Francestown	2005
Lake Sunapee Protective Association	Sunapee	2005
Lake Tarleton Weed Watcher Group	Piermont	2005
Ossipee Lake Alliance- Camp Calumet Vacationers	Ossipee	2005
Highland Lake Weed Watchers	Andover	2005
Great East Lake Association	Wakefield	2005
Harvey Lake Weed Watcher Group	Northwood	2005
Otternic Pond Association	Hudson	2005
Warren Lake Association	Alstead	2005
Kezar Lake Association	Sutton	2005
Jenness Pond Weed Watchers	Northwood	2005
Plymouth State University Summer Science Institute	Plymouth	2005
Stinson Lake Weed Watchers	Rumney	2005
Swains Lake Association	Barrington	2005
Milton Three Ponds Association	Milton	2005
Eastman Lake Association and Weed Watchers	Grantham	2005
Mine Falls Pond Group	Nashua	2005
Blaisdell Lake Weed Watchers	Sutton	2005
Pratt Pond Association	New Ipswich	2005
Lovell Lake Association Weed Watchers	Wakefield	2005
Antioch Graduate School- Environmental Science Class	Keene	2005
St. Anselm College	Manchester	2005
NH Technical College	Belknap	2005
Distance Learning Network	Goffstown	2005

2.1.2 Dissemination of Exotic Aquatic Plant Information through the Media

The Exotic Aquatic Plant Program was the focus of two live radio broadcasts in 2004 and 2005. Both were with NH Public Radio.

Another mechanism of media publicity was through several interviews and local coverage by Channel 9 News. At least three times during the summers of 2004 and 2005, DES worked with Channel 9 to broadcast information about control practices, preventative measures, and proactive approaches to exotic aquatic plant control, as well as zebra mussel prevention in 2005.

The Exotic Aquatic Plant Program maintains a regularly updated website at www.des.state.nh.us/wmb/exoticspecies/. The website provides links to exotic plant

identification information, weed watching information, exotic aquatic plant distribution maps, and copies of fact sheets and exotic aquatic plants legislation and regulations. The site is frequently updated with new information on lake and river infestations, and facts and figures on exotic aquatic plants.

To inform boaters and other users of our surface waters, DES, the New Hampshire Fish and Game Department, and the New Hampshire Department of Resources and Economic Development have collaborated to have signs posted at each of the state-owned public access sites. These signs warn boaters about exotic plant infestations, and where to look on their recreational equipment for tag-along plant fragments. Examples of each type of sign are included in Appendix 4.

DES also worked with Representative Peyton Hinkle to showcase exotic species on the Representative's local community television show entitled "Peyton's Place". The show focused on exotic aquatic plant ecology, prevention, early detection, and management.

2.1.3 Milfoil Prevention Grants

To further promote milfoil prevention activities and stimulate cooperative ventures with various interest groups, DES has implemented a milfoil and other exotic aquatic plant prevention grant program. Funding for this program was established through legislation (RSA 487:25-29), and as of January 1, 2003, \$3 from each boat registration fee is allocated towards this innovative grant program.

The intent of the milfoil prevention grants is to garner public support and participation in milfoil prevention activities, including such activities as education and outreach initiatives, staffing public access sites to conduct inspections of aquatic recreational gear for attached aquatic plant fragments, and other similar projects.

A Request for Proposals was issued in September 2004 and in September 2005. In 2004, the Department received three proposals, which were reviewed by a committee comprised of a designee of the Commissioner of the Department of Environmental Services, a designee of the Commissioner of the Department of Safety, and a member of the New Hampshire Lakes Management Advisory Committee. The proposals were reviewed for eligibility and ranked based on the review criteria included in the 2004 Management Plan for Milfoil Prevention Grants (Appendix 5). Three of the four projects were funded. The fourth project was delayed several times during the review process for Governor and Council approval. Due to this delay the project start date was delayed one year until the 2006 summer season.

Tables 2-2 A & B summarize the funded projects and their respective funding levels for 2004 and 2005:

Table 2-2 A
Summary of 2004 Prevention and Research Grant Funded Projects

Grantee	Project Summary	Grant Amount
Ossipee Lake Alliance Prevention Grant	The goal of the proposed program was to prevent milfoil and other invasive non-native weeds from entering or leaving Ossipee Lake by (i) creating a comprehensive grassroots community initiative to implement boater education and voluntary, self-monitored inspection programs at each of the lake's more than 20 access points; (ii) expanding public education outreach through new printed materials and media initiatives; and (iii) implementing a lake-wide weed monitoring program. Successful completion of the program will provide a model for other lakes with a large number of boat ramps controlled by private interests, including and most especially those lakes that are overseen by multiple communities or states.	\$14,800.00
New Hampshire Lakes Association (NHLA) Prevention Grant	<p>The purpose of the NHLA project was to prevent the introduction of exotic aquatic plants into lakes and ponds in New Hampshire by administering a Lake Host Program on public access sites throughout the state. Sixty-one public access sites on 50 lakes and ponds across New Hampshire were staffed in 2004 through this grant, and Lake Hosts inspected over 31,000 boats and trailers.</p> <p>Lake Hosts conducted inspections of boats, trailers and other recreational gear as they entered and departed public waters. They also distributed pamphlets and other educational materials to recreationists and recorded data on the numbers and types of recreational vessels visiting these access sites, as well as data on plants that may have been attached to recreational gear.</p> <p>The NHLA coordinated all aspects of implementation for this program, including the hiring of lake hosts, payroll, and coordinating training of all participants.</p> <p><i>Lake Hosts discovered viable exotic plant material on 16 boats and trailers in 2004, and removed the plant fragments before boats were launched into an uninfested waterbody. Therefore, this program is recognized for 'saving' sixteen previously uninfested waterbodies from exotic plants.</i></p> <p>A summary of key Lake Host data is included in Appendix 6.</p>	\$165,000.00
Department of Safety, Division of Safety Services (NHDOS) Prevention Grant	<p>The purpose of the Department of Safety, Division of Safety Services project was to update and expand the New Hampshire Boater's Guide to include more information on exotic aquatic plants.</p> <p>Four additional pages of information on exotic plants were developed by the Department of Environmental Services for inclusion in the Department of Safety's Boater's Guide, replacing the single page in the previous edition. These Guides are distributed to over 100,000 boaters each year.</p>	\$3,507.50
Suncook Lake	The Suncook Lake Association proposed to use the herbicide 2,4-D	\$60,750.00

Grantee	Project Summary	Grant Amount
Association/University of New Hampshire Research Grant	in a demonstration project in their fight to control the spread of variable milfoil (<i>Myriophyllum heterophyllum</i>) in Lower Suncook Lake. The Suncook Lake Association – Milfoil Control Committee prepared a new and scientific approach to battle milfoil. The plan involved the use of GPS equipment to first delineate the infested areas, followed by herbicide treatment, and then a series of scientific measurements to determine the results. A team of well trained divers made up of people who have property on the lake were crucial to the success of the project. They provided the hands and eyes for pre- and post surveys and management of any plants that survived herbicide treatment. UNH's involvement included conducting flow studies of Lower Suncook Lake, monitoring 2,4-D concentrations in water samples from the lake and nearshore wells, and determining appropriate methods to reduce the concentration of 2,4-D in water.	

Table 2-2 B
Summary of 2005 Prevention and Research Grant Funded Projects

Grantee	Project Summary	Grant Amount
Connecticut River Conservation District Coalition Prevention Grant	Unfortunately due to problems with obtaining approval on this grant contract, work was not done during the summer of 2005. This grant was eventually approved in November 2005, and work will be conducted in summer 2006.	\$0 in 2005
New Hampshire Lakes Association (NHLA) Prevention Grant	<p>The purpose of the NHLA project was to prevent the introduction of exotic aquatic plants into lakes and ponds in New Hampshire by administering a Lake Host Program on public access sites throughout the state. Fifty-six public access sites on 56 lakes and ponds across New Hampshire were staffed in 2005 through this grant, and Lake Hosts inspected over 34,900 boats and trailers.</p> <p>Lake Hosts conducted inspections of boats, trailers and other recreational gear as they entered and departed public waters. They also distributed pamphlets and other educational materials to recreationists and recorded data on the numbers and types of recreational vessels visiting these access sites, as well as data on plants that may have been attached to recreational gear.</p> <p>The NHLA coordinated all aspects of implementation for this program, including the hiring of lake hosts, payroll, and coordinating training of all participants.</p> <p><i>Lake Hosts discovered viable exotic plant material on 54 boats and trailers in 2005, and removed the plant fragments before boats were launched into an uninfested waterbody. Therefore, this program is recognized for 'saving' fifty-four previously uninfested waterbodies from exotic plants.</i></p> <p>A summary of key Lake Host data is included in Appendix 6.</p>	\$185,000.00

Grantee	Project Summary	Grant Amount
Department of Safety, Division of Safety Services (NHDOS) Prevention Grant	The purpose of the Department of Safety, Division of Safety Services project was to update and expand the New Hampshire Boater's Guide to include more information on exotic aquatic plants. Four additional pages of information on exotic plants were developed by the Department of Environmental Services for inclusion in the Department of Safety's Boater's Guide, replacing the single page in the previous edition. These Guides are distributed to over 100,000 boaters each year.	\$3,507.50
Suncook Lake Association (SLA) Research Grant	The purpose of the SLA project is to improve the design of the signaling scuba tow (SST) that is critical in the fight to control the spread of variable milfoil (<i>Myriophyllum heterophyllum</i>) in Lower Suncook Lake. The use of this device made it possible to successfully treat the Lower Lake with 2, 4-D herbicide during the summer of 2004 under a 2003-2004 Research Grant.	\$13,000

Under the provisions of RSA 487:25, funding for the Prevention Grant Program will sunset on January 1, 2008. The intent of the sunset provision was to allow for evaluation of the program to determine its effectiveness and worthiness for continued funding after 2008. Without the prevention grant program in place for the last three years, New Hampshire could have realized a two-fold increase in the number of infested waterbodies in New Hampshire, as evidenced by the number of 'saves' from the Lake Host Program in the table above.

DES is working with the Exotic Aquatic Weeds and Species Committee established by RSA 487:30 in 2005, to review program success and to repeal the sunset provision, so that funding can continue to be allocated for this important prevention and research grant program.

2.2 Early Detection - Monitoring and Identification

DES takes an active role in monitoring both the natural environment, as well as retail sales of aquatic plants, to prevent new introductions of nuisance species into New Hampshire's surface waters. Following is a summary of the monitoring activities conducted in 2004 and 2005.

2.2.1 Field Monitoring

Between 2004 and 2005, DES biologists conducted aquatic macrophyte mapping as an element of the scheduled lake assessments at 80 lakes. Any new or existing infestations of exotic aquatic plants were documented and mapped, and control actions were recommended based on the status of the infestation. No new infestations of exotic aquatic plants were documented during lake assessment surveys in 2004 or 2005.

2.2.2 Pet and Plant Nursery Store Monitoring

In 1998, legislation went into effect banning certain activities associated with exotic aquatic plants in New Hampshire. Specifically, RSA 487:16-a states, "*No exotic aquatic weeds shall be offered for sale, distributed, sold, imported, purchased, propagated, transported, or introduced in the state of*

New Hampshire.” To implement this program, the Department of Environmental Services adopted rules to prohibit the following exotic aquatic plants in the state:

Yellow Floating Heart (*Nymphoides peltata*)
 Frogbit (*Hydrocharis morsus-ranae*)
 Water Chestnut (*Trapa natans*)
 Variable Milfoil (*Myriophyllum heterophyllum*)
 Eurasian Milfoil (*Myriophyllum spicatum*)
 Parrot Feather (*Myriophyllum aquaticum*)
 Curly-Leaf Pondweed (*Potamogeton crispus*)
 Brazilian Elodea or Anacharis (*Egeria densa*)
 Hydrilla or Anacharis (*Hydrilla verticillata*)
 Common Reed (*Phragmites australis*)
 Flowering Rush (*Butomus umbellatus*)
 Purple Loosestrife (*Lythrum salicaria* & cultivars)
 Fanwort (*Cabomba caroliniana*)
 European Naiad (*Najas minor*)

During the 2004 and 2005 summer seasons, DES staff inspected 121 pet and plant stores. A thorough plant inspection at each store was followed by the distribution of educational materials and references to state laws on exotic aquatic plants to store owners. Stores were also provided with pamphlets to distribute to customers when they purchased aquatic plants.

In 2004, three stores found to be offering prohibited plants for sale were issued Letters of Deficiency (LODs) and two received Administrative Fines for repeat offenses. Two stores offered the sale of Brazilian elodea (*Egeria densa*), while the other offered the sale of purple loosestrife. The two stores issued administrative fines were owned by the same individual. These stores offered the sale of hydrilla, Brazilian elodea, parrot feather, variable milfoil, and Eurasian water milfoil.

Three stores were issued LODs in 2005. Two of the stores were offering the sale of parrot feather, and one was offering hydrilla. Table 2-3 lists the stores that received enforcement actions during 2004 and 2005. These stores will be re-examined in 2006 to determine continued compliance with the state laws and regulations.

Table 2-3
Retail Store Exotic Plants Violations

Date	Nursery	Location	Exotic Plant	Action
7/2/04	Parkhurst Nursery	Bristol	Purple Loosestrife	LOD
8/5/04	Pet City	Seabrook	Brazilian elodea	LOD
8/5/04	Little Shop of Pets	Portsmouth	Brazilian elodea	LOD
3/26/04	Lebanon Pet and Aquarium	Lebanon	Parrot feather and Brazilian elodea	Administrative Fine
3/25/04	Claremont Pet and Aquarium	Claremont	Hydrilla, Variable milfoil, Eurasian milfoil	Administrative Fine
8/18/05	Benson's Lumber and Hardware Nursery Section	Londonderry	Parrot feather	LOD
9/1/05	Pet City	Seabrook	Hydrilla	LOD

Date	Nursery	Location	Exotic Plant	Action
9/1/05	Zoo Creatures	Plaistow	Parrot feather	LOD

2.2.3 Volunteer Weed Watcher Program

The goal of the Weed Watcher program is to promote a volunteer, grass-roots effort to monitor lakes, ponds, and rivers for the early detection of exotic aquatic plant infestations. Because eradication of established exotic plant infestations is rarely possible, early detection is of utmost importance. Trained Weed Watchers monitor waterbodies for new infestations frequently during the summer season, and report suspected new infestations to DES. This allows DES biologists to respond rapidly, in the same season as the discovery.

Weed Watcher volunteers are trained by DES biologists to identify both exotic aquatic plants and native plants that are common in their waterbody. Typically, training involves providing volunteers with photographic keys to native and exotic plants and accompanying them in the field to instruct them how to identify plants within their chosen waterbody. If no exotics are present, the Coordinator will provide specimens of exotic aquatic plants for the volunteers to use as learning tools. Volunteers are also supplied with vegetation maps that were prepared by the DES Lake Assessment Program for their waterbody, a Weed Watcher Kit containing fact sheets on the exotic plants, instruction on how to Weed Watch, maps of infestations in the state, and laminated plant identification guides. Instructions on how to immediately report any suspected new infestations are also included in the kit, as well as how to collect and send samples of suspect plants to DES for positive identification. In 2004, volunteers from 24 new lakes participated in the program and in 2005, 23 new lakes participated in the program. Figure 2-1 shows the distribution of active Weed Watching groups in New Hampshire.

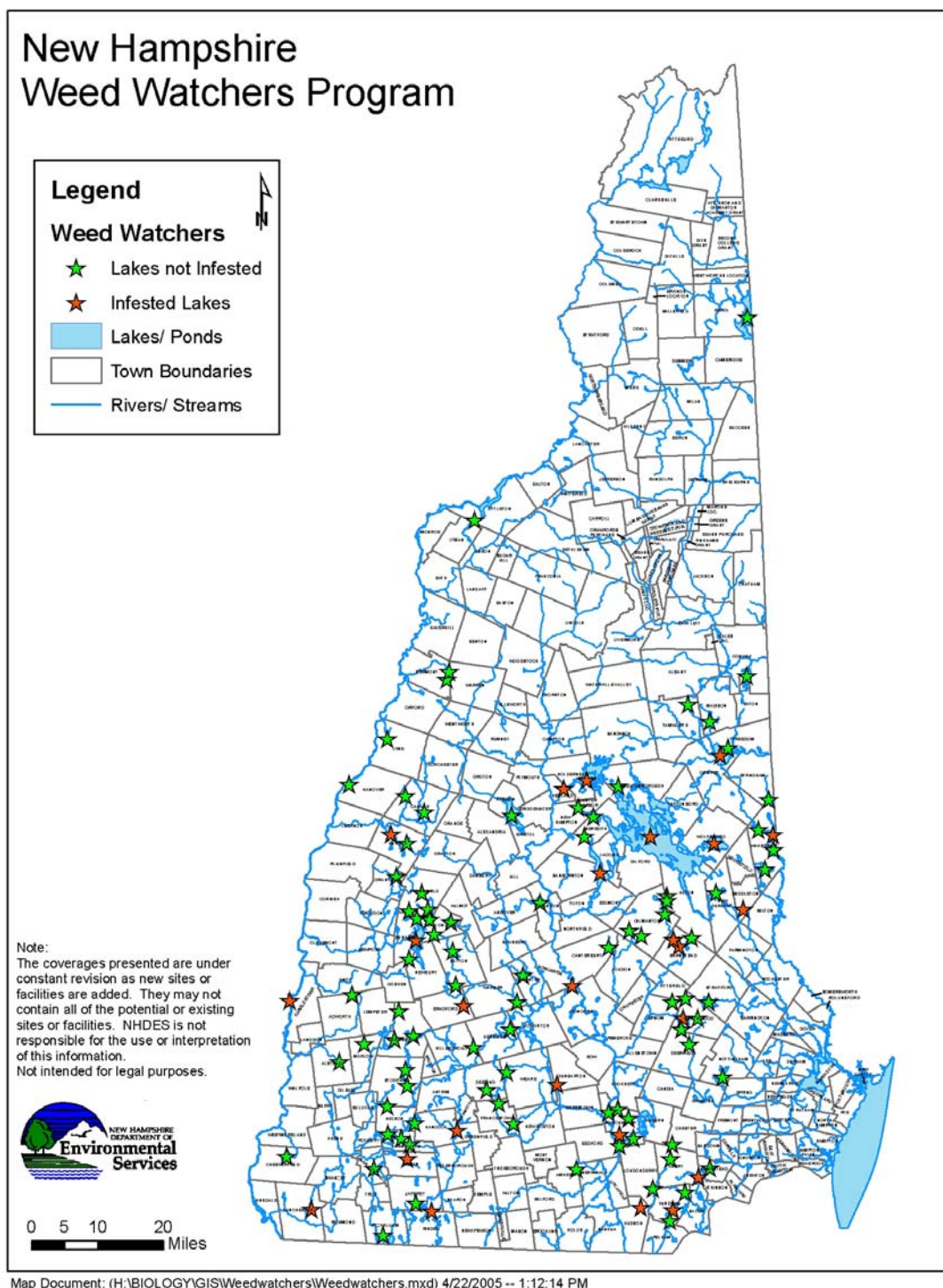
Weed Watcher volunteers survey their waterbody once each month from May through September. Volunteers closely monitor the shallow lake bottom zones for new plant growth and map any vegetation they observe. The volunteers provide plant survey information to DES for entry into a database, and they collect specimens of unfamiliar plants and deliver them to DES for positive identification. There are now over 400 trained Weed Watchers monitoring over 100 waterbodies for early detection of exotics. This does not include a number of volunteers from the Volunteer Lake Assessment Program that participate on an "unofficial" basis (some have not been trained by the Coordinator so they are not considered official Weed Watchers).

Fortunately, of the 308 unfamiliar plants that were delivered to DES during the 2004 and 2005 seasons by volunteers, 303 were native plants, and only five new infestations of exotic plants were discovered. These new infestations have been tracked for the 1-2 years, but because the plants did not flower until 2005, their species identification was unknown. The confirmation of their exotic nature resulted in their listing in 2005, despite the fact that the infestation may not have been newly established that year.

Interestingly, the exotic species program also had a report of zebra mussels in New Hampshire in 2005. At Fay's Boat Yard in Gilford, New Hampshire, a marina worker identified zebra mussels on a boat hull at the marina, and immediately reported the sighting to the Exotic Species Program. The Exotic Species Program coordinator and the Limnology Center

Director conducted a site inspection, and documented growths of zebra mussels on the hull, engine mounts, propeller, and trailer of the vessel. The vessel had previously been in a waterbody in Ohio, and was recently moved to New Hampshire for use in Lake Winnepesaukee.

Figure 2-1
Weed Watcher Lakes in New Hampshire



Thanks to the attentive marina worker, the boat was not launched into Lake Winnepesaukee until it had been thoroughly cleaned and disinfected.

2.3 Control

The Exotic Aquatic Plant Program relies on a number of methods to control exotic plant infestations, including physical control, chemical control, biological control, and habitat manipulation. DES typically integrates one or more of these control strategies for each lake, in a method termed 'Integrated Pest Management' (IPM). IPM strategies generally result in longer term control than any one control method.

Table 2-4 outlines possible control methods, including information on target plant specificity, advantages, disadvantages, and approximate cost (cost analysis provided by Aquatic Control Technologies, Inc., 1997). Criteria for the selection of control techniques are presented in Appendix 7.

During 2004-2005, 31 herbicide treatments, 8 benthic barriers, 17 hand pulls, and 2 harvesting activities were conducted. Table 2-5 provides details on the specific projects that were funded by NH DES.

2.3.1 Restricted Use Areas

Restricted Use Areas (RUAs) are a regular control option for lakes with small, contained infestations of exotic plants, limited to small patches or embayments. This is often the case in waterbodies with newly-discovered infestations. RUAs restrict access to all recreational activities in a delineated area to minimize plant fragmentation and thereby reduce the spread of milfoil. As an additional method of protection from fragment migration, RUAs are encircled with a shallow net that is suspended vertically in the water column. The net is approximately 1.5-2.0 feet in height. The top of the net is set to extend four inches above the surface of the water, while the remainder is positioned below the surface of the water (see Figure 2-2). This configuration prevents the movement of fragments from infested areas to uninfested areas.

Figure 2-2: Schematic of Restricted Use Area Net

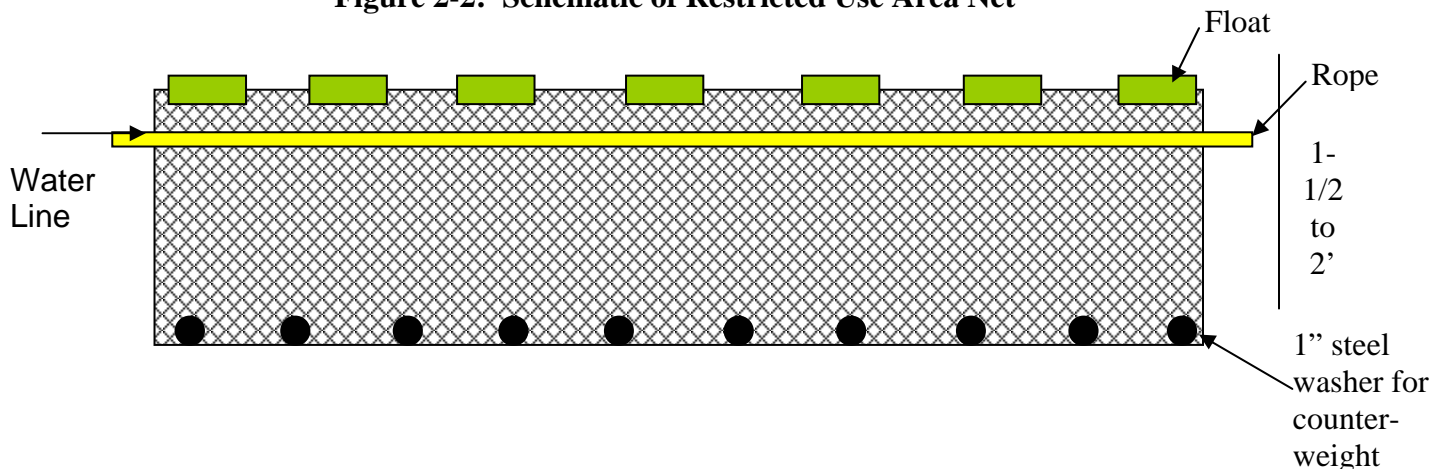



Table 2-4
DES Exotic Aquatic Plants Program: Plant Control Techniques (cost estimates from 1997)

Action	Effectiveness	Specificity to Target	Advantages	Disadvantages	Cost*
Hand Pulling (Physical)	Removes a few individual plants at a time	High	Good for localized areas/ few plants Plants physically removed from waterbody	Labor intensive Good for small infestations only. Not practical when plant growth is dense	Labor Costs vary depending upon contractor costs or staff time  acre estimate
Mechanical Harvesting (Physical)	Removes large amounts of vegetation at a time	Not specific	Rapidly removes vegetation from area Removes plants physically from waterbody	Residual plant fragments could cause regrowth Removes beneficial native vegetation along with the exotics. Could increase turbidity, ultimately affecting other aquatic life Does not remove roots	Ranges widely depending on plant density, location, disposal, etc. \$350-\$1500 per acre
Hydro-raking (Physical)	Removes large amounts of vegetation at a time	Not specific	Rapidly removes vegetation Removes roots to prevent rapid regrowth. Removes plants physically from waterbody	Residual plant fragments could cause regrowth Could increase turbidity, ultimately affecting other aquatic life Removes beneficial native vegetation along with the exotics.	Ranges widely depending on plant density, location, and disposal. \$350-\$2500 per acre
Permeable Benthic Barrier (Physical) Permeable Benthic Barrier (cont.)	Used for very small infestations	Specific to area where barrier is located Impacts all plants under barrier	Compresses plants to sediments and prevents likelihood of fragmentation by wind, wave, or anthropogenic means	Labor intensive Requires frequent barrier cleaning or re-staking Does not physically remove plants from waterbody May cause sediment/water oxygen depletion May impact non-target species such as fish	\$0.60-\$1.22 per square foot or(\$25,000-\$50,000 per acre)

Action	Effectiveness	Specificity to Target	Advantages	Disadvantages	Cost*
Herbicides (Chemical)	Herbicides which are taken up by root systems (systemic herbicides) more effective than contact herbicides	Most chemicals have target plants for which they are most effective Varying application rates can increase target specificity	Chemical can eliminate exotic plant infestation if done at correct time, and if correct concentration is used Relatively rapid effect Can be target specific	Chemicals added to waterbody May impact non-target species Could be environmentally damaging by impacting non-target species, if not applied per label restrictions	Varies with chemical and size of treatment area ~\$350-450/acre for 2,4-D ~\$250-350/acre for Diquat Plan for approximately \$2000 of additional fees for permitting and sample/analysis
Drawdown (Habitat Manipulation)	Somewhat effective if repeated frequently I thought data show it's ineffective?? More effective if drawdown maintained for long time period	Not specific	Could control density of vegetation due to plant die off from desiccation or freezing Can be cost effective	Impacts non-target plants Impacts fish, amphibians, insects, and other aquatic organisms Drastically changes entire waterbody ecology	Low cost if dam or other means of drawing down water is available
Drawdown (cont.)					
Dredging (Habitat Manipulation)	Effective in removing plants from localized area where dredge takes place	Not specific	Completely removes all plant material Removes nutrient laden sediments Removes seed bank	Drastically changes entire waterbody ecology Impacts non-target plants and animals Could cause excessive turbidity Must wait for waterbody fill after dredging	Previously used and successful in one lake in New Hampshire (Milville Lake) \$16,000-32,000 per acre

Action	Effectiveness	Specificity to Target	Advantages	Disadvantages	Cost*
Insects, bacteria, or viruses that infect and kill or weaken target plants (Biological)	List specific organisms and targets. Effective against target plants	Specific	Insects, bacteria, or viruses used in this method are typically specific to target plant. Their life cycles revolve around particular plant species Does not affect other non-target plants	May cause decline in oxygen as plant material decays Many biological controls are themselves exotic Still experimental	Cost of insects Monitoring cost high

*Costs are averages determined from data obtained from “Draft Generic Environmental Impact Report” for Massachusetts, and from Aquatic Control Technology, Inc. Fact Sheet.

Table 2-5
Summary of 2004 through 2005 Control Projects

Waterbody/Town	Benthic Barriers	Hand Pulls	Harvesting	RUAs*	Chemical
2004					
Lower Suncook Lake, Barnstead		X			X
Northwood Lake, Northwood	X	X			X
Lake Massabesic, Auburn	X	X		X	
Forest Lake, Winchester		X			X
Potanipo Lake, Brookline					X
Leavitt Bay/Phillips Brook	X	X			X
Melendy Pond, Brookline					X
Lake Massasecum, Bradford	X	X	X	X	
Haunted Lake, Francestown		X			X
Lake Winnepesaukee, Paugus Bay, Pickerel Cove					X
Balch Pond/Woodman Lake		X		X	X
Sunrise Lake, Middleton					X
Lake Monomonac, Rindge		X			X
Lake Winnepesaukee, Meredith Yacht Club					X
Lake Winnepesaukee, Minge Cove, Alton					X
Little Squam Lake, Ashland				X	
Squam Lake, Holderness				X	
Nashua River, Nashua		X			
2004 Totals:	4	10	1	5	13
2005 Waterbody/Town	Benthic Barriers	Hand Pulls	Harvesting	RUAs*	Chemical
Cobbetts Pond, Windham					X
Melendy Pond, Brookline					X

Waterbody/Town	Benthic Barriers	Hand Pulls	Harvesting	RUAs*	Chemical
Potanipo Lake, Brookline					X
Horseshoe Pond, Merrimack					X
Ottarnic Pond, Hudson		X			X
Lake Winnepesaukee, Lake Shore Park, Gilford					X
Lake Winnepesaukee, Pickerel Cove, Laconia					X
Lake Massasecum, Auburn	X	X	X	X	
Rocky Pond, Gilmanton					X
Lake Winnepesaukee, Hemlock Harbor, Moultonborough					X
Lees Pond, Moultonborough		X			X
Lake Winnepesaukee, Back Bay, Wolfeboro					X
Lake Winnepesaukee, Melvin Village					X
Little Squam Lake, Ashland	X	X		X	X
Squam Lake, Holderness	X	X		X	
Lake Monomonac, Rindge					X
Balch Lake, Wakefield		X		X	X
Gorham Pond, Dunbarton					X
Lake Winnepesaukee, Moultonborough Bay, Moultonborough					X
Contoocook Lake, Rindge					X
Lake Ossipee, Ossipee	X	X			
Lake Massabesic, Auburn				X	
2005 Totals:	4	7	1	5	18

To install an RUA, DES must notify the Fish and Game Department, and the Department of Safety and obtain their concurrence in the designation.

Example #1 - Lake Massasecum, Bradford

An RUA has been in place on Lake Massasecum, Bradford since the summer of 1999. An infestation of variable milfoil covering approximately 10 acres of the northern cove has been successfully contained since the RUA has been in place. The netting continuously traps floating fragments of the plant. Volunteers regularly clean milfoil fragments from the net.

Example #2 - Lake Massabesic, Manchester

Lake Massabesic is Manchester's water supply, and also receives high levels of transient boat traffic. Manchester Water Works has maintained four RUAs on the lake since 1996; two near Deer Neck Bridge (Route 28), and two near Claire's Landing in Auburn. As Lake Massabesic is a public water supply, herbicides are not an option in the control of exotic aquatic plants. The RUAs have been effective in keeping boaters out of isolated patches of milfoil in the lake, and the patches have not spread.

Table 2-6 lists the locations of active Restricted Use Areas in 2004 and 2005. A posting of the locations of RUAs is also listed on the DES website at www.des.state.nh.us/wmb/exoticspecies.

Table 2-6
List of Restricted Use Areas in place in 2004 and 2005

Waterbody	Town	Date Installed	Date Removed
Lake Massabesic	Auburn	1996	Still in place
Lake Massasecum	Bradford	1998	Still in place
Little Squam Lake	Ashland	2001	Removed for 2003 season, reinstalled in 2004 and still in place
Big Squam Lake	Holderness	2005	Still in place
Lake Sunapee	Georges Mill	2001	2002
Balch Lake*	Wakefield	2002	Still in place

*This RUA is more of a containment device for fragments. Access is not restricted.

2.3.2 Hand-pulling

When infestations of exotic aquatic plants begin as single scattered stems or small patches, DES biologists SCUBA dive to hand-pull the plants. This control practice has proven successful in many waterbodies.

For a new infestation, hand-pulling activities are typically conducted several times during the first season, with follow-up inspections for the next 1-2 years or until no re-growth is observed.

Example #1- Lake Sunapee at Georges Mills

Following hand-pulling activities in 2001 when variable milfoil was first sighted in Lake Sunapee, Georges Mills continues to be free from exotic plants. An occasional stem of variable milfoil breaches the benthic barrier, but it is quickly hand-pulled by DES staff or from Lake Sunapee Protective Association staff.

Example #2- Dublin Lake, Dublin

A new variable milfoil infestation was found on Dublin Lake lake in 2001, and hand-pulling, combined with benthic barriers, were the control strategies used in that first year. In 2004 and 2005, DES biologists visited the infested area and found no milfoil plants.

2.3.3 Benthic Barriers

When a small infestation of exotic aquatic plants occurs in clusters of growth, as opposed to scattered stems, a permeable opaque fiberglass screen can be placed over the area of infested lake sediments. The permeable fabric screening allows for gas release from the sediments while effectively blocking sunlight and compressing the plants into the sediment, inhibiting photosynthesis and eventually killing the plant. Occasionally, in some lakes, gas release from decomposition of organic material in the sediments or boating activity causes screen uplifting. Benthic barriers can effectively control small infestations of less than approximately 1000 square feet.

2.3.4 Dredging

Dredging is costly, and milfoil and other exotic plants tend to quickly colonize disturbed areas that have been altered by such control activities. If a dredge does not completely remove all plant fragments from the lake, the area will be quickly re-colonized, thereby negating the effect of the dredge. This was seen at Mallards Landing on Lake Winnisquam in 2001, and at Jay's Marina on Lake Winnisquam which was quickly colonized by milfoil after dredging for boat navigation in the 1980s.

Dredging has been successfully employed on one occasion for eradication of an exotic aquatic plant infestation in New Hampshire. Milville Lake, Salem was dredged in the mid 1980s to remove an infestation of exotic fanwort and the lake has not been re-infested since that time.

No dredging activities took place in 2004 or 2005 for exotic plant management.

2.3.5 Targeted Application of Herbicides

Herbicide applications are conducted each year by certified applicators in response to requests from businesses, lake associations and municipalities. If the infestation is new or previously undocumented by DES, DES will fund 100% of the initial treatment costs. Subsequent to the initial treatment DES may match up to 50% of the treatment costs. Herbicides can result in 1 to 3 years of exotic aquatic plant control. All herbicide applications are performed under permits issued by the New Hampshire Department of Agriculture, Division of Markets and Food, Bureau of Pesticide Control.

Two herbicides have been used in New Hampshire for the control of variable milfoil. Diquat (trade name Reward), the most often-used herbicide, is a contact herbicide that can provide up to two seasons of milfoil control. Because this herbicide does not target the root systems, the plants eventually re-grow from established roots.

The second herbicide, 2,4-D (trade name Navigate or Aqua-Kleen), is a systemic herbicide. It is absorbed into the sediments and taken up through the root system, killing both the roots and the plant biomass above the sediments. Label restrictions for aquatic application have limited its use in New Hampshire to waterbodies with no water intakes or where property owners have removed water intakes for a period of time.

A new herbicide, Fluridone (trade name Sonar) was used in New Hampshire during the 2002 season to treat fanwort infestations in Robinson Pond in Hudson. This herbicide was added to the pond in June 2002 and the concentration was maintained through the summer to target the plant. Follow-up inspections showed that the herbicide successfully controlled both fanwort and milfoil growths. Unfortunately some small populations of the milfoil plants did survive the treatment, so regrowth was observed in both 2004 and 2005.

2.3.6 Extended Drawdown

Drawdowns have been used in the past for plant control. In theory, the drying of the plants in the summer, or the freezing of the plants in the winter, can eliminate or limit plant growth. However, milfoil often forms a more succulent terrestrial form during drawdown conditions and the succulent form of the plant can remain viable for long periods of time without submergence, making the practice ineffective.

During the history of the Exotic Aquatic Plant Program, controlled drawdown has been only partially successful at one lake, Mountain Pond in Brookfield. In the 1980s, the pond was heavily infested with Eurasian milfoil. In 1991 the outlet structure was demolished and the pond was left empty for three full years to expose the plant to the elements. After three years, the outlet structure was rebuilt to raise the water level. Annual surveys in the late 1990s showed no re-growth of the Eurasian milfoil, but a regrowth of native vegetation. However, during a follow-up survey in 2003, 5-6 foot tall stems of Eurasian milfoil were found growing in the pond. At this point it is unknown if this is a new infestation or a re-growth. However, DES believes it is most likely a re-growth of the plant since Mountain Pond is a relatively remote waterbody.

2.4 Research

Research activities are a key element in the Exotic Aquatic Plant Program. Because variable milfoil is the most common exotic aquatic plant in New Hampshire but not a common nuisance species in most of the United States, little research nationwide has been conducted on the plant's biology, ecological relationships, and potential control strategies. By working with local colleges and universities, as well as field-testing various hypotheses on New Hampshire waterbodies, the Program can address the needs for finding viable control solutions that apply to existing infestations and the development of more effective prevention mechanisms.

Two exciting research endeavors were developed in 2004 and 2005. One was the establishment of the Milfoil Research Grants, which are funded under RSA-487:23. The other

was a one-time special federally funded study through both the US Environmental Protection Agency and the National Oceanic and Atmospheric Administration.

2.4.1 State-Funded Milfoil Research Grants

Milfoil Control on Suncook Lake, Barnstead

As discussed earlier in this report, new funding was established by legislation on January 1, 2003, which resulted in research projects funded by Milfoil and Other Exotic Aquatic Plant Research Grants. Projects to receive this funding are aimed at controlling milfoil or other exotic aquatic plant species in New Hampshire.

The first Milfoil Research Grant Project was funded in 2004. The project was a cooperative effort between the Department of Environmental Services, the Suncook Lake Association, and the University of New Hampshire. This study focused on the control of variable milfoil in Lower Suncook Lake. With the aid of SCUBA divers and Geographic Positioning System Units (GPS), the Suncook Lake Association diligently mapped and geo-referenced the milfoil populations in Lower Suncook Lake. The infested areas were then mapped and used to plan a comprehensive herbicide application using 2,4-D. The involvement of the University of New Hampshire was key in three ways; 1) UNH conducted drogue studies to determine hydraulic flow paths through the lake which was used to determine the dosing of the herbicide application, 2) UNH produced a pre- and post-herbicide treatment video to document the effectiveness of the treatment, and 3) UNH assisted with chemical analyses of well water pumped from nearshore areas of the lake to determine if nearshore wells were contaminated with 2,4-D, and also experimented with ways to ameliorate 2,4-D concentrations in water.

The study has so far been a success. No nearshore wells were contaminated with 2, 4-D, despite a vigorous pumping regime. No re-growth of variable milfoil was observed in Lower Suncook Lake in 2005, and continued monitoring will be conducted to track the long-term effectiveness of this control practice.

Re-Design of Diver Assisted SCUBA Tow

This is an innovative project that the Suncook Lake Association (SLA) established in 2005 to perfect the engineering design for a Signaling SCUBA Tow (SST) device that will significantly aid divers in the mapping of exotic aquatic plants. The device works in such a way that a diver towed behind a boat simply pushes a button on a hand-held device that triggers a signal on the surface to another individual using a GPS device that designates the location of a milfoil patch. The established map point makes hand-removal and herbicide applications more precise, due to increased precision in mapping the plant locations. The Suncook Lake Association divers used this device during their research grant to control milfoil growths in their lake in 2004. This device proved invaluable, and the Lake Association in cooperation with a local fluids engineering firm have applied for DES research grants to further its development.

Funding for Research Grants is set to sunset on January 1, 2006 because the funding for this program is a part of the Prevention Grant Fund, which was discussed earlier in this report. . DES plans to work with the legislatively enacted Milfoil Study Committee in 2006 to repeal the

sunset provision, so that funding can continue to be allocated for this important research grant program.

2.4.2 Federally Funded Milfoil Research Grants

During winter 2004, DES was the recipient of approximately \$1 million dollars of federal appropriations. Half of this one-time appropriation came from the Environmental Protection Agency (EPA), with the other half being allocated by the National Oceanic Atmospheric Administration (NOAA). The money was earmarked for research on variable milfoil control, to be conducted by academia or qualified consulting firms. As a result, in winter 2003, DES sent out a request for conceptual proposals to research entities in New Hampshire and surrounding states to solicit proposals for variable milfoil related research.

A total of 13 conceptual proposals were submitted to DES in spring 2004. After two rounds of reviews by a committee of five, personal presentations and interviews with the top eight candidates and lead researchers, DES selected six finalists for the grant funds. Table 2-7 lists the project titles and lead researchers, the cost for each project, and a summary of the project purpose.

Research will focus on two key areas: risk assessment for new infestation and management/control of existing infestations. Three of the six projects will focus on examining various aspects of water quality data and sediments to determine commonalities between environmental and spatial data as they pertain to the existence of variable milfoil populations in New Hampshire and beyond. Some genetics work will also be involved in identifying milfoil species.

Armed with this information, DES hopes to better understand the characteristics of lakes, ponds, and rivers that can support variable milfoil growth based on the study results. Waterbodies with the key characteristics will signal DES to increase its efforts at prevention and early detection of variable milfoil.

The remaining three projects will focus on various aspects of control, including herbicide bioassays, biological control, and plant replacement techniques. The goal here is to find herbicides and biological controls that are most effective in stemming variable milfoil growth in waterbodies, while avoiding impacts to non-target species. It is hoped that if variable milfoil populations can be kept in check through integrated pest management practices, that native plants will have a better opportunity to prosper and limit the growth of variable milfoil.

Table 2-7
List of Federally Funded Milfoil Research Projects

Project Title	Lead Researchers	Cost	Purpose
Evaluation of Seven Aquatic Herbicides for the Selective Control of Variable Milfoil	Dr. Kurt Getsinger and Dr. Mike Netherland, US ACOE	\$200,000	The purpose of the Army Corps of Engineers, Waterways Experimental Station research is to develop specific strategies for aquatic herbicide use that incorporate plant phenology, water quality, and treatment timing, for optimal, cost-effective and selective control of variable milfoil in New Hampshire water bodies.
An Exploration of the Use of Parasitic Nematodes for the Biological Control of Variable Milfoil	Mr. Jeff Schloss, Dr. Garrett Crow, University of New Hampshire	\$225,000	The purpose of the University of New Hampshire research is to compare and characterize the plant and nematode communities along with water chemistry and sediment conditions, associated with variable milfoil in its native range and in New Hampshire lakes using traditional, molecular and genetic tools, and discover possible plant-nematode association that can be of use in biological control of variable milfoil.
Integration of Hydro acoustic and Water-Quality Related Assessments for Identifying Susceptible Areas for Variable Milfoil Growth	Jeff Deacon, Richard Kiah, and Jane Denny, U.S. Geological Survey	\$112,000*	The purpose of the US Geological Survey research is to evaluate the effects of chemical and physical properties on variable milfoil, to develop an effective monitoring tool to support resource managers responsible for mitigating the impacts of variable milfoil, and to determine optimal aquatic habitat characteristics (chemical and physical) for milfoil establishment and growth in New Hampshire lake environments. Geophysical surveys, vegetation surveys, water quality sampling, and integrating the geophysical, vegetation, and water-quality data will be conducted.
Using Dispersal and Environmental Variables to Predict milfoil Occurrence and Susceptibility to Invasion by Non-Native Milfoil in New Hampshire Lakes	Dr. Ryan Thum, Cornell University Dr. Jay Lennon, Brown University	\$50,000	The purpose of the research conducted by Dr. Ryan Thum and Dr. Jay Lennon is to identify lake attributes that influence the distribution of native and non-native (<i>M. heterophyllum</i>) milfoils in New Hampshire (NH). The researchers will use a combination of multivariate statistics and logistic regressions to determine whether invasive milfoil species are correlated with chemical, morphological, biological, and/or spatial characteristics of NH lakes. This research extends their previous research concerning the causes of aggressive growth in invasive milfoils and makes efficient use of a large amount of existing data with powerful discriminatory statistical techniques.

Project Title	Lead Researchers	Cost	Purpose
			Results from this study will identify classes of lakes that may be susceptible for colonization by invasive <i>M. heterophyllum</i> .
Variable Milfoil Plant Replacement Project	Dr. Ken Wagner and Ms. Wendy Corbin, ENSR Corporation	\$124,792*	The purpose of the first research project conducted by ENSR Corporation is to perform an experimental rooted plant replacement project. The Plant Replacement Program is an attempt to establish a native, non-nuisance assemblage dominated by low-growing species such as <i>Nitella</i> , <i>Najas</i> or <i>Potamogeton</i> . This effort involves both removal of the current dominant milfoil population over a target area early in the growing season and planting or seeding with the desired species. A multi-treatment, multi-plot experimental design is planned.
The Effects of Water and Sediment Chemistry, Sediment Physical Properties, Number and Size of Contiguous Wetlands, and Watershed Geology in Variable Milfoil Abundance or Presence/Absence	Dr. Ken Wagner and Ms. Wendy Corbin, ENSR Corporation	\$89,566	The purpose of the second research project conducted by ENSR Corporation is to investigate the effects of water and sediment chemistry, sediment physical properties, number and size of contiguous wetlands, and watershed geology on variable milfoil (<i>Myriophyllum heterophyllum</i>) abundance or presence/absence. The objective of this investigation is to determine if a correlation exists between these variables and variable milfoil growth.

*Total project cost is inclusion of fees/charges from sub contractual work used in these projects.

2.5 Regional Cooperation

A primary goal of regional cooperation is to standardize the list of prohibited exotic aquatic plants among New England states, and to establish common legislation, regulations, and rapid response protocols with neighboring states.

Until 2003, only New Hampshire, Vermont, and Maine had passed legislation prohibiting the sale or transport of certain listed exotic plants. Now, other states are becoming interested in creating programs and legislation, and in fact, Connecticut passed new legislation in 2003 that prohibited certain activities associated with exotic aquatic plants. If a standardized list of prohibited exotic plants within each state can be developed in the New England region and neighboring states, it would decrease the likelihood of the spreading these plants to new waterbodies.

During 2004-2005, New Hampshire's Exotic Aquatic Plant Program Coordinator attended various planning meetings in other states, at their request, to assist in developing exotic plant legislation and promoting successful programs like Weed Watchers.

Additionally, in an effort to promote further cooperation among the New England states and the northeast area in general, New Hampshire is active in various professional organizations associated with exotic species control and outreach activities. Goals of these organizations include fostering partnerships between states to reduce the transport of exotic plants, sharing success and failure information with regards to control practices, and strategizing to enhance existing programs and laws to reduce the impacts of invasive plants. Following is a list of the regional, national, and international organizations with which NHDES is involved:

- **Northeast Aquatic Plant Management Society (NEAPMS)**- State and regional government officials, academia, and plant management specialists are represented with the goal of sharing resources and information concerning management practices and innovative technologies, as well as providing a forum for interaction between government, academia, and managers.
 - In 2004 and 2005, two regional conferences took place that allowed for the exchange of information on various management strategies employed within the various states, as well as the development of new legislation and regulations, and the certification of new aquatic herbicides for use on exotic aquatic plants.
 - New Hampshire coordinated and led a panel discussion in 2005 on the various elements of each northeastern state's exotic species initiatives.
- **North American Lake Management Society (NALMS)**- This organization focuses on a variety of lake management issues, including exotic plant management and impacts to lake ecology as a result of exotic aquatic plant infestations. This organization is representative of state, federal, and regional, and international government officials, academia, professional research organizations, and miscellaneous non-government officials and organizations. NALMS meets twice annually and also has regional chapters throughout North America that meet at least on an annual basis.
 - In 2004 and 2005 NALMS offered special sessions on invasive species

management.

- In 2005, the Exotic Species Program Coordinator participated in a plant identification workshop.
- **NH Invasive Species Committee (ISC)**- This committee was established by RSA 430:54 in 2000. This committee is comprised of one representative from each state agency (including the Departments of Agriculture, Fish and Game, Environmental Services, and Resources and Economic Development), one representative from academia (UNH), one from the nursery industry, and three members at large from the public. The group is charged with developing a list of prohibited species to include terrestrial plants and animals (aquatic plants are already coordinated through DES, and aquatic animals through Fish and Game) in New Hampshire, finding ways to enforce compliance with listed species, and developing education and outreach materials for target audiences that are affected by the plants and animals. This group meets on a monthly basis in Concord, NH.
- **Northeast Invasive Plant Group (NIPGRO)**- NIPGRO is an organization established by the US Fish and Wildlife Service to protect the resources of the Connecticut River and its watershed. The group focuses on both terrestrial and aquatic plants that are invasive in the states bordering the river system. The group supports the development of a region-wide plant atlas, the development of educational materials pertaining to each invasive species, and the sharing of information between the states. This group meets once annually, and hosts an informational 'share fair' once every three years.
 - In 2005 the Exotic Species Program Coordinator participated in a Rapid Response Planning session organized by this group, and gave a presentation on New Hampshire's initiatives.
- **Northeast Aquatic Nuisance Species Task Force (NEANSTF)**- This group is a regional panel of the National Aquatic Nuisance Species Task Force. The goals of this group are to assist the northeastern states and Eastern Canadian provinces in developing state, provincial, and regional Aquatic Nuisance Species Management Plans. The group is represented by state agencies across the northeast, and meets three times each year. In 2003, DES participated in a special focus group to develop a model guidance Rapid Response plan to be implemented by northeastern states.
 - During 2004 and 2005 this group worked on continuing to develop educational materials and to revise drafts of the region-wide Rapid Response outline.
- **New Hampshire Aquatic Nuisance Species Management Plan Steering Committee**- This is a group comprised of state agency personnel and private special interest groups (like the New Hampshire Lakes Association) that are working towards developing a statewide Aquatic Nuisance Species Management Plan for New Hampshire. There is a federal initiative to have each state develop its own management plan and submit it to the regional chapters for initial review, with subsequent filing with the national Aquatic Nuisance Species Task Force. The purpose of these management plans is develop state strategies for dealing with existing and potential infestations of exotic aquatic plants and animals that pose a threat to its water resources. Once a state has a developed plan the

likelihood of federal technical and financial assistance is increased. DES is the lead agency for formulating this plan. A draft of the plan was prepared by the end of 2005, and it is currently going through review within the Steering Committee. A target date for a completed plan is Fall 2006, at which time it will be submitted to the national Task Force for review.

3. PROGRAM COSTS

Beginning in 1981, exotic plant control activities were funded by a \$0.50 fee added to boat registrations. Then, in 1998, the legislature established the Lake Restoration and Preservation Fund and a fee of \$1.50 per boat registration was deposited in the fund for the Exotic Aquatic Plants Program. In 2003, program funds were again increased with the enactment of RSA 487:26, which established a Milfoil and Other Exotic Aquatic Plant Prevention and Research Fund. This new legislation added an additional \$3 fee per boat registration in the state. From this, DES anticipates an annual income of \$300,000, which will fund Milfoil and Other Exotic Aquatic Plant Prevention and Research Grants. Table 3-1 summarizes the breakdown of the \$5 boat registration fee.

Table 3-1
Program Funding (per boat registration)

Program	Funding	Activities
Clean Lakes Program	\$0.50	<ul style="list-style-type: none">• Lake and watershed studies• Sampling• Administrative costs
Invasive Aquatic Plant Program	\$1.50	<ul style="list-style-type: none">• Monitoring for exotic plants• Control grants• Benthic barrier supplies• Educational materials• Administrative costs
Milfoil and other Exotic Plant Prevention and Research Grant Program	\$3.00	<ul style="list-style-type: none">• Funding for prevention grants• Funding for research grants

Table 3-2 summarizes the income and expenditures of this dedicated fund for exotic plant related monies. A full summary of the 2004 and 2005 budgets for the Exotic Aquatic Plants Program can be found in Appendix 8.

The milfoil control fund pays 100% of the control costs for newly documented infestations, up to 50% of the cost for subsequent control practices, and up to 80% of the costs for innovative control measures, with the remaining costs paid by local organizations, businesses municipalities, or individuals. Figure 3-1 illustrates the DES expenditures for exotic plant control grants, and matching grants from municipalities, businesses and lake associations for each year of the program.

Each year DES receives more requests for funding than it has resources to grant, and has subsequently asked for increased match from the grantees. Because the requests for control grants are expected to continue to exceed the current budgeted amount for control activities, DES has developed a priority-rating model for funding control projects that was initiated during the 2004 season. A copy of the rating model is included in Appendix 9. DES plans to work with the legislature on the possibility of increasing funding for control practices in the future.

**Table 3-2
Program Income and Expenditures for 1982-2005***

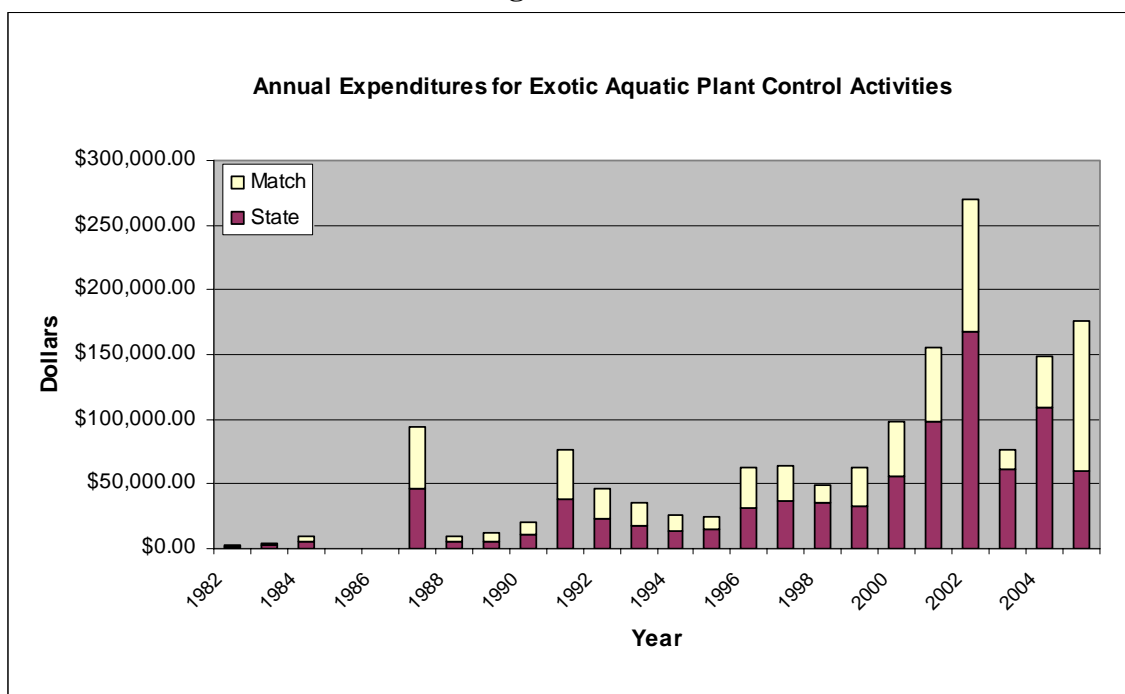
FISCAL YEAR	INCOME	EXPENSES	ENCUMBRANCES	BALANCE
1982	\$12,258.50	\$144.45		\$12,114.05
1983	\$27,309.00	\$1,214.31		\$38,208.74
1984	\$24,387.50	\$2,949.57		\$59,646.67
1985	\$23,969.50	\$7,201.50		\$76,414.67
1986	\$36,026.50	\$2.40		\$112,438.77
1987	\$35,674.00	\$47,138.04	\$33.90	\$100,940.83
1988	\$38,701.50	\$32,552.85	\$9,270.90	\$97,852.48
1989	\$39,584.50	\$60,569.02	\$10,635.50	\$75,503.36
1990	\$42,784.00	\$50,092.53	\$15,351.61	\$63,478.72
1991	\$41,702.64	\$35,384.19	\$42,944.89	\$42,203.89
1992	\$39,267.50	\$46,711.82	\$6,763.72	\$70,940.74
1993	\$38,436.00	\$48,870.21	\$3,455.48	\$63,814.77
1994	\$38,299.88	\$37,969.16	\$16,941.11	\$50,659.86
1995	\$47,414.00	\$57,011.20	\$18,666.67	\$39,337.10
1996	\$43,790.00	\$57,441.36	\$12,573.92	\$31,778.49
1997	\$46,293.50	\$34,247.75	\$34,663.19	\$21,734.97
1998	\$145,809.00	\$94,880.92	\$25,333.22	\$81,993.02
1999	\$174,211.50	\$129,486.71	\$41,367.32	\$110,683.71
2000	\$226,455.00	\$175,293.23	\$80,510.62	\$122,702.18
2001	\$195,628.00	\$259,223.99	\$60,530.33	\$79,086.48
2002	\$205,487.00	\$262,358.82	\$80,512.00	\$2,232.99
2003	\$440,460.00	\$234,736.82	\$39,900.00	\$248,568.17
2004	\$537,702.00	\$358,012.82	\$148,751.86	\$319,405.49
2005	\$370,097.50	\$368,846.91	\$188,785.02	\$280,622.92
TOTALS	\$2,871,748.52	\$2,402,340.58	\$836,991.26	\$280,622.92

Encumbrance column added in FY2002. Our records only go back to 1987.

*Values represent monies from both control and prevention/research funds and Clean Lakes Program

**Due to a near shortfall of funds in 2002 due to an increase in the numbers of plant management practices, conservative budgetary measures were followed in 2003, resulting in an increased FY End Balance shown for 2003 and beyond.

Figure 3-1



4. THE FUTURE

The goals of the Exotic Aquatic Plant Program are to limit the further spread of exotic aquatic plants, control new and existing infestations, and to research new ways to contain or even decrease the spread of these plants. Objectives in the five focus areas are:

Education and Outreach: Foster increased partnerships among lake associations, state agencies, regional groups, and other aquatic interests to provide and disseminate innovative and proactive educational materials that inform the public about exotic aquatic plants, how they are spread, and how they can be controlled.

Monitoring for Early Detection and Rapid Response: Expand the Weed Watcher Program and coordinate training activities with volunteer monitors from other lakes management programs. Map infestations using global positioning systems to more accurately document and track the occurrence and distribution of infestations over time.

Control: Develop a more streamlined process, including appropriate monitoring and environmental assessment, for conducting herbicide applications.

Research: Send out Requests for Proposals for specialists to conduct research on long-term control methods and potential means for eradication of exotic aquatic plants. Develop DNA gene sequencing methods for positive identification of variable milfoil during all life stages. Provide this technology to the DES Limnology Center so samples will not have to be sent out to other universities for analyses. Encourage state universities and colleges to submit proposals for research on exotic aquatic plants.

Regional Cooperation: Foster partnerships with other states across the northeast region to better promote an understanding of exotic aquatic plants and their impacts on our water resources. Assist other states in developing and/or enhancing exotic species legislation.

Looking to 2006 and beyond, we would like the program to grow to meet the challenge of preventing new exotics infestations, controlling existing ones, and researching new techniques for control and even eradication of exotic aquatic plants. We expect the recent dramatic increase in requests for control grants to continue, spurred by increased public awareness and interest. There is much to be done.

The sections below summarize a vision for program activities in SFY 2006 and 2007.

4.1 Education and Outreach

- ❖ Produce a colored poster depicting the fourteen prohibited exotic aquatic plants, distribute it free to the public and post it at boat launches, marinas, state and local offices
- ❖ Update and revise the “Frightful Fourteen” pamphlet to include colored photographs of prohibited plants
- ❖ In partnership with NHLA, work to continue annual implementation and expansion of the Lake Host Program
- ❖ Continue to publish a “Weed Watchers” newsletter each summer
- ❖ Produce Weed Watcher t-shirts for trained Weed Watchers (funding permitting)
- ❖ Update fact sheets and educational materials for distribution to the public, as needed
- ❖ Conduct plant identification and Weed Watcher workshops in conjunction with the annual

- Volunteer Lake Assessment Program Refresher Workshop and Lake Host trainings
- ❖ Give educational presentations to lake associations and other stakeholder groups
- ❖ Work with Fish and Game and the US Fish and Wildlife Service on the Pilot Communications Project for exotic species in New Hampshire
- ❖ Work with the Department of Transportation to develop a sign for posting at the state borders to warn boaters and other aquatic recreationists of invasive species problems in New Hampshire
- ❖ In 2007 prepare a 2006-2007 Program Report

4.2 Monitoring, Identification, and Prevention

- ❖ Train additional volunteer Weed Watchers to locate new exotic plant infestations earlier in the growing season
- ❖ Train VLAP volunteers in both native and exotic aquatic plant identification
- ❖ Locate and map individual infested areas of exotic aquatic plants using GPS
- ❖ Update mapping technology and techniques based on successful methods developed by other researchers, and field experience of DES biologists
- ❖ Prepare long-term management plans for each lake with an exotic aquatic plant, outline the status of the infestation, special species of concern, and management goals and timetables
- ❖ Assist the Pesticide Control Board of the Department of Agriculture with aquatic herbicide permits and evaluations
- ❖ Continue to conduct annual inspections of aquarium stores and nurseries to investigate illegal sales of exotic aquatic plants
- ❖ Conduct 30-40 lake macrophyte surveys each summer as part of the Lake Assessment Program
- ❖ Update prohibited exotic aquatic plant list in the rules per recommendations from academia, as well as trends in plant movement in the northeast
- ❖ Continue to provide updates to the University of Connecticut “Invasive Plant Atlas of New England” (IPANE)
- ❖ Continue to support the efforts of Lake Hosts and other groups that monitor public access sites to prevent the further introduction of exotic aquatic plants

4.3 Control

- ❖ Continue to explore avenues to increase funding for control practices through legislation, grants, and federal appropriations
- ❖ Continue to improve the application process for control grants, including an RFP and timelines that encourage permit application submittal by early fall of each year
- ❖ Continue to explore alternative methods of control through internet searches for activities in other states, through scientific literature reviews, and through attendance at exotic plant management symposia
- ❖ Award Research Grants to institutions of higher learning to explore new avenues for aquatic plant management
- ❖ Update, as necessary, Milfoil Control Grant Review Matrices for all future control activity requests for funding

- ❖ Take the lead in coordinating the preparation of a state-wide Aquatic Nuisance Species Management Plan, including the incorporation of stakeholder interests, and submitting that plan to the US Fish and Wildlife Service for review and approval.

4.4 Research

- ❖ Continue to track and manage the six milfoil research projects that were funded under federal appropriations
- ❖ Explore ways to increase or continue funding for research on invasive plants
- ❖ Provide grants for innovative research projects related to exotic aquatic plants from funds derived from the Milfoil Research Grant Program.
- ❖ Partner with state colleges and universities to conduct biological and ecological research on variable milfoil
- ❖ Work to establish a DNA fingerprinting program for milfoil species within the DES Limnology Center
- ❖ Work with the New Hampshire Lakes Association to solicit federal funds for increasing the level and intensity of research on variable milfoil

4.5 Regional Cooperation

- ❖ Attend invasive species conferences to keep up with current research methods, educational activities, control measures, and exotic aquatic plants programs, and share the New Hampshire experience
- ❖ Give presentations on New Hampshire's programs to impart information on both the successes and needs for improvement in the various categories within the Exotic Aquatic Plant Program
- ❖ Assist neighboring and nearby New England states in promoting and drafting exotics legislation by giving presentations to appropriate legislative committees, if asked, and provide copies of New Hampshire's legislation and annual reports
- ❖ Continue to actively participate in regional groups and organizations to expand resources and the knowledge base for New Hampshire's program

4.6 Legislation and Regulations

- ❖ Continue to work with the Exotic Aquatic Weeds and Species Committee to refine and expand the DES Exotic Species Program
- ❖ Work on legislation to procure more funding for control
- ❖ Work on legislation to remove the sunset provision from the Prevention and Research Grant Program.
- ❖ Re-adopt and amend Chapter Env-Ws 1300 of the Exotic Species Rules.

References

- Halstead, J.M., J. Michaud, S. Hallas-Burt, and J.P. Gibbs. 2001. An Hedonic Analysis of the Effects of an Exotic Invader (*Myriophyllum heterophyllum*) on New Hampshire Lakefront Properties. University of New Hampshire, Durham.

Appendix One

Clean Lakes Statutes RSA 487:15 through RSA 487:25

and

Chapter Env-Ws 1300 of New Hampshire Administrative Rules

TITLE L WATER MANAGEMENT AND PROTECTION

CHAPTER 487 CONTROL OF MARINE POLLUTION AND AQUATIC GROWTH

New Hampshire Clean Lakes Program

487:15 Purpose. – The general court recognizes that rapidly escalating pressures of shorefront development and recreational uses of public waters have placed increasing strains upon the state's lake resources, thereby accelerating the eutrophication process in many of our public lakes through nuisance growths of aquatic macrophyton and phytoplankton (algae) and thus posing a threat to water quality. The general court further recognizes the need to restore, preserve and maintain the state's lakes and ponds in order that these significant environmental, aesthetic and recreational assets will continue to benefit the social and economic well-being of the state's citizens.

Source. 1990, 143:2, eff. June 18, 1990.

487:16 Definitions. – In this subdivision:

- I. "Department" means the department of environmental services.
- II. The term "exotic aquatic weeds" includes only those species of vascular aquatic plants which were not part of New Hampshire's native aquatic flora before 1950. *Cabomba caroliniana* and *Myriophyllum heterophyllum* are examples of exotic aquatic weeds.
- III. "Federal program" means the federal Water Pollution Control Act, 33 U.S.C.A. 1324, the federal clean lakes program (P.L. 92-500, section 314), as amended, now known as the Water Quality Act of 1987 (P.L. 100-4), as amended.
- IV. "Commissioner" means the commissioner of the department of environmental services.

Source. 1990, 143:2. 1996, 228:98, 99. 1997, 185:2, eff. Jan. 1, 1998.

487:16-a Exotic Aquatic Weed Prohibition. – No exotic aquatic weeds shall be offered for sale, distributed, sold, imported, purchased, propagated, transported, or introduced in the state. The commissioner may exempt any exotic aquatic weed from any of the prohibitions of this section consistent with the purpose of this subdivision.

Source. 1997, 185:3, eff. Jan. 1, 1998.

487:16-b Exotic Aquatic Weed Penalties. – It shall be unlawful to knowingly, recklessly, or purposely offer for sale, distribute, sell, import, purchase, propagate, or introduce exotic aquatic weeds into New Hampshire waterbodies. Notwithstanding RSA 487:7, any person engaging in such an activity shall be guilty of a violation.

Source. 1999, 204:3, eff. Jan. 1, 2000.

487:17 Program Established. –

I. A program for the preservation and restoration of New Hampshire lakes and ponds eligible under RSA 487:20 shall be established and administered within the department of environmental services. Said program shall function to limit the eutrophication process in New Hampshire lakes by reducing nuisance growths of macrophyton and phytoplankton. It shall reinforce and complement the program authorized by the federal program and shall serve 3 basic purposes:

- (a) To diagnose degraded lakes and ponds and implement long-term solutions for the purpose of restoring water quality where such solutions are feasible and cost effective.
- (b) To diagnose lakes and ponds and implement methods for long-term preservation of the water quality when such measures can be shown to be feasible and cost effective.
- (c) To provide short-term remedial actions which can effectively maintain water quality conditions adequate for

public recreation and enjoyment, including, but not limited to, the control of exotic aquatic weeds pursuant to paragraphs II and III.

II. The department is directed to prevent the introduction and further dispersal of exotic aquatic weeds and to manage or control exotic aquatic weed infestations in the surface waters of the state. The department is authorized to:

(a) Display and distribute promotional material and engage in educational efforts informing boaters of the problems with exotic aquatic weed control.

(b) Control small new infestations of exotic aquatic weeds, according to the following criteria:

(1) The waterbody had been free, within the previous 5 years, of the exotic aquatic weed to be treated.

(2) The infestation is not widespread in the waterbody, and the department shall have determined that the exotic aquatic weed can in fact be controlled in the waterbody.

(3) The most environmentally sound treatment technique relative to the specific infestation will be used, which also meets the requirements of state rules, including rules adopted under RSA 430.

(c) Develop an emergency response protocol to control small new infestations. The protocol may include contractual agreements with one or more licensed pesticide applicators that would enable the prompt treatment of exotic aquatic weeds with herbicides consistent with the criteria provided in subparagraph (b).

(d) Designate, in consultation with the department of fish and game and the division of safety services, department of safety, restricted use of exotic aquatic weed control areas.

III. After notice and opportunity for hearing and comment, the department may make financial grants to lakefront associations, private businesses, citizens, and local governmental agencies for the management of exotic aquatic weeds where eradication is deemed impossible. All applications for grants by such groups shall be approved by both the department and the fish and game department, and shall meet state rule requirements.

Source. 1990, 143:2. 1996, 228:100, 106. 1997, 185:4, eff. Jan. 1, 1998. 2002, 201:4, eff. Jan. 1, 2003.

487:18 Project Prioritization. – Project approval shall be based upon prioritization factors to be established by rules adopted under RSA 541-A. Such rules shall give first priority for expenditure of available funds to the control of new infestations of exotic aquatic weeds pursuant to RSA 487:17, II(b). Otherwise, preference shall be given to lakes that have public access or that serve as a public drinking water supply. Implementation measures shall be based upon an assessment of potential success, technical feasibility, practicability, and cost effectiveness. Restoration and preservation projects shall include watershed management plans to control and reduce incoming nutrients wherever possible through best management practices. Repeated short-term solutions shall be discouraged where long-term solutions are feasible and cost effective. Treatments shall be designed to minimize any adverse effect upon fish and wildlife, their habitats, and the environment.

Source. 1990, 143:2, eff. June 18, 1990. 2002, 201:5, eff. Jan. 1, 2003.

487:19 Public Hearings. – No project for the implementation of a lakes restoration or preservation program shall be approved or initiated until at least 2 public hearings have been held on the project. Said hearings shall be held in one or more of the affected municipalities.

Source. 1990, 143:3, eff. June 18, 1990.

487:20 Eligibility. – To be eligible for funding under this subdivision, a body of water shall be any freshwater lake or pond which meets priorities established under RSA 487:18. Lakefront associations, private businesses, citizens and local government agencies shall be eligible to apply for funding under this subdivision.

Source. 1990, 143:3, eff. June 18, 1990

487:21 Cost Sharing. –

I. For diagnostic and feasibility studies where the federal government has made financial assistance available in the amount of 70 percent of the cost, the department may provide an amount not exceeding 30 percent of the total eligible costs as determined by the department. Where no federal funding is available, the department may provide an amount not exceeding 80 percent of the total eligible costs.

II. For implementation of restoration or preservation projects where the federal government has made financial assistance available in the amount of 50 percent of the costs, the department may provide an amount not exceeding 35 percent of the total eligible costs, as determined by the department. Where no federal funding is available, the department may provide an amount not exceeding 80 percent of the total eligible costs.

III. For water quality maintenance programs, the department may provide an amount of funding not to exceed 80 percent of the total eligible costs, as determined by the department, except that for the control of new infestations of exotic aquatic weeds the state may assume 100 percent of the cost.

IV. The local cost share shall be the cost of a project remaining after taking into account any state and federal funding.

V. An amount up to 10 percent of the total available funding may be expended on research that addresses the problems of lake eutrophication and exotic aquatic weeds.

Source. 1990, 143:3. 1996, 228:106, eff. July 1, 1996. 2002, 201:6, eff. Jan. 1, 2003.

487:22 Municipal Agreements. – Whenever a project requires a commitment of cooperative action or local cost sharing involving 2 or more municipalities, all participating municipalities shall execute an intermunicipal agreement relative to their respective obligations. No project which requires a local match shall be initiated with state funding until such an agreement, if applicable, has been approved by the legislative bodies of all the involved municipalities.

Source. 1990, 143:3, eff. June 18, 1990.

487:23 Agency Cooperation. – The department shall make a concerted effort to integrate and coordinate the clean lakes program with other environmental management programs involving lakes and their watersheds, whether such programs fall within the jurisdiction of the department of environmental services or within that of another state department. The university system and the department shall maintain regular communication for the purpose of sharing data bases and other relevant information.

Source. 1990, 143:3. 1996, 228:101, eff. July 1, 1996.

487:24 Rulemaking. – The commissioner shall adopt rules, under RSA 541-A, relative to:

I. The criteria to be used in the prioritization of grants for diagnostic or feasibility studies.

II. The criteria used to determine the priority of implementation projects and maintenance projects.

III. Contracting procedures with local governments or private businesses.

IV. Application procedures to participate in the program.

V. Criteria for the determination of project eligibility.

VI. Criteria governing the conduct of and reporting requirements on diagnostic and feasibility studies, implementation projects and maintenance projects.

VII. Designation of plants as exotic aquatic weeds as defined in RSA 487:16, II.

VII-a. Administration and enforcement of, and exemptions to, the exotic aquatic weed prohibition under RSA 487:16-a.

VII-b. Criteria governing the emergency response protocol under RSA 487:17, II(c).

VII-c. Designation of restricted use exotic aquatic weed control areas under RSA 487:17, II(d).

VIII. Any other matters that are necessary to implement the provisions of this subdivision.

Source. 1990, 143:3. 1997, 185:5. 1999, 204:4, eff. Jan. 1, 2000.

487:25 Lake Restoration and Preservation Fund; Addition to Boat Fee. –

[Paragraph I effective until January 1, 2008; see also paragraph I set forth below.]

I. The fee of \$5 collected under the provisions of RSA 270-E:5, II(a) shall be paid to the director of the division of motor vehicles. The director of the division of motor vehicles shall pay over said fee to the state treasurer who shall

keep the fee in a special fund to be expended by the department of environmental services. The department shall use \$.50 of the fee for lake restoration and preservation measures, exclusive of exotic aquatic weed control, \$1.50 of the fee for the control of exotic aquatic weeds, and \$3 of the fee for the milfoil and other exotic aquatic plants prevention program. The department shall deposit the \$3 into a special account within the lake restoration and preservation fund which shall be used to administer the milfoil and other exotic aquatic plants prevention program. The special fund shall be nonlapsing. All funds received under this section are continually appropriated to the department for the purposes of this subdivision.

[Paragraph I effective January 1, 2008; see also paragraph I set forth above.]

I. The fee of \$2 collected under the provisions of RSA 270-E:5, II(a) shall be paid to the director of the division of motor vehicles. The director of the division of motor vehicles shall pay over said fee to the state treasurer who shall keep the fee in a special fund to be expended by the department of environmental services. The department shall use \$.50 of the fee for lake restoration and preservation measures, exclusive of exotic aquatic weed control, and \$1.50 of the fee for the control of exotic aquatic weeds. The special fund shall be nonlapsing. All funds received under this section are continually appropriated to the department for the purposes of this subdivision.

II. The department is authorized to utilize such methods of control and to employ such personnel, consultant services, and equipment as, in its judgment, will control aquatic nuisances in the surface waters of the state as defined in RSA 485-A:2.

III. The department shall be the agency to receive and utilize federal funds, gifts, or grants from any person or association, which may be made available for the purposes of this subdivision.

Source. 1990, 143:3. 1996, 228:102, 106. 1997, 185:6, eff. Jan. 1, 1998. 2002, 201:2, eff. Jan. 1, 2003, 201:9, eff. Jan. 1, 2008.

487:26 Grant Program Established. –

There is hereby established a grant program to be administered by the department of environmental services for the allocation of money to state agencies, non-profit organizations, and municipalities or political subdivisions of the state which seek to administer a milfoil and other exotic aquatic plants prevention program, and to institutions of higher learning which seek to conduct research on milfoil and other exotic aquatic plants remediation techniques. The grant program shall be funded by the portion of the lake restoration and preservation fund, established in RSA 487:25, and allocated to the milfoil and other exotic aquatic plants prevention program. Up to 2/3 of the moneys distributed from the fund to the milfoil and other exotic aquatic plants prevention program shall be allocated for the purposes of milfoil and other exotic aquatic plants prevention and the remainder shall be allocated to milfoil and other exotic aquatic plants remediation research. Of the moneys in the milfoil and other exotic aquatic plants prevention program, the moneys allocated specifically for the purposes of the milfoil and other exotic aquatic plants prevention shall be distributed upon approval of the commissioner of the department of environmental services and the commissioner of safety. Of the moneys in the milfoil and other exotic aquatic plants prevention program, the moneys allocated specifically for the purposes of milfoil and other exotic aquatic plants remediation research shall be distributed upon approval of the commissioner of the department of environmental services.

Source. 2002, 201:3, eff. Jan. 1, 2003.

487:27 Management Plan. –

The commissioner of the department of environmental services, or designee, in consultation with the commissioner of safety, or designee, shall establish a management plan to implement the grant program. The management plan shall include, but not be limited to:

- I. Eligibility determination criteria and procedures.
- II. Application requirements and procedures.
- III. Project selection and prioritization requirements and procedures.
- IV. Stewardship requirements and procedures, including annual reporting to the department by the grantee.

Source. 2002, 201:3, eff. Jan. 1, 2003.

[RSA 487:28 repealed by 2002, 201:7, eff. Jan. 1, 2008.]

487:28 Eligible Applicants; Matching Funds. –

I. The department of environmental services shall distribute funds for projects to further the purposes of this program only to eligible applicants. Eligible applicants shall include:

(a) Publicly-supported nonprofit corporations exempt from federal income taxation under Section 501(c) of the Internal Revenue Code.

(b) Municipalities or other political subdivisions of the state.

(c) Institutions of higher learning.

(d) State agencies.

II. All eligible applicants shall provide a minimum level of matching resources equal to 50 percent of the proposed program budget. The department may exempt institutions of higher learning from the required match. The cost-sharing match may be met through the use of in-kind services. Qualifying matching funds from the applicant may include, but are not limited to, municipal appropriations, private donations, federal funds, and the value of goods and services provided by the applicant.

Source. 2002, 201:3, eff. Jan. 1, 2003.

[RSA 487:29 repealed by 2002, 201:7, eff. Jan. 1, 2008.]

487:29 Milfoil and Other Exotic Aquatic Plants Prevention; Grant Fund Report and Budget. –

The department of environmental services shall submit an annual report, beginning on January 1, 2004, to the speaker of the house, president of the senate, and the governor and council which shall include, but not be limited to, a description of prevention and research projects funded by the milfoil and other exotic aquatic plants prevention program and the extent of aid to municipalities or subdivisions of the state, non-profit corporations, and research institutions.

Source. 2002, 201:3, eff. Jan. 1, 2003.

487:30 Exotic Aquatic Weeds and Species Committee. –

I. There is established a committee to study exotic aquatic weeds and species in the state of New Hampshire.

II. (a) The members of the committee shall be as follows:

(1) Five members of the house of representatives, appointed by the speaker of the house.

(2) One member of the senate and one public member, appointed by the president of the senate.

(b) Members of the committee shall serve terms which are coterminous to their terms on the general court and shall receive mileage at the legislative rate when attending to the duties of the committee.

III. The committee shall study the spread of exotic aquatic weeds and exotic aquatic species in the waters of New Hampshire. The study shall include education, management, and potential means to eliminate the spread of these weeds and species.

IV. The members of the committee shall elect a chairperson from among the members. The first meeting of the committee shall be called by the first-named house member. The first meeting of the committee shall be held within 45 days of the effective date of this section. Four members of the committee shall constitute a quorum.

V. The committee shall report its findings and any recommendations for proposed legislation to the speaker of the house of representatives, the senate president, the house clerk, the senate clerk, the governor, and the state library on or before November 1 of each year.

Source. 2004, 115:1, eff. May 17, 2004. 2005, 240:2, eff. July 14, 2005.

CHAPTER Env-Ws 1300 EXOTIC AQUATIC WEED CONTROL

Statutory Authority: RSA 487:24, VII-a, VII-b, and VII-c

PART Env-Ws 1301 PURPOSE AND APPLICABILITY

Env-Ws 1301.01 Purpose. The purpose of these rules is to implement RSA 487:16-a, which prohibits the sale, distribution, importation, purchase, propagation, transportation, or introduction into the state of exotic aquatic

weeds, and RSA 487:17, II (d) relative to the designation of control areas for exotic aquatic weeds.

Source. #6852 eff 9-5-98

Env-Ws 1301.02 Applicability. These rules shall apply to people who live, work, and recreate on the lakes of New Hampshire, as well as people who own stores that sell exotic aquatic weeds.

Source. #6852 eff 9-5-98

PART Env-Ws 1302 CHAPTER DEFINITIONS

Env-Ws 1302.01 "Bottom barrier" means a semi-permeable, fine mesh screening, laid over an area of sediments in a lake to shade and physically inhibit plant growth.

Source. #6852 eff 9-5-98

Env-Ws 1302.02 "Commissioner" means the commissioner of the department of environmental services.

Source. #6852 eff 9-5-98

Env-Ws 1302.03 "Cultivar" means a cultivated species of plant for which there is no wild form.

Source. #6852 eff 9-5-98

Env-Ws 1302.04 "Department" means the department of environmental services.

Source. #6852 eff 9-5-98

Env-Ws 1302.05 "Exotic aquatic weeds" means "exotic aquatic weeds" as defined by RSA 487:16, II, namely "only those species of vascular aquatic plants which were not part of New Hampshire's native aquatic flora before 1950. *Cabomba caroliniana* and *Myriophyllum heterophyllum* are examples of exotic aquatic weeds."

Source. #6852 eff 9-5-98

Env-Ws 1302.06 "Herbaria" means collections of dried, pressed plants for the purposes of education and scientific study.

Source. #6852 eff 9-5-98

Env-Ws 1302.07 "Infested waters" means water and water bodies having populations of prohibited exotic aquatic weeds such as milfoil or fanwort.

Source. #6852 eff 9-5-98

Env-Ws 1302.08 "Limited infestations" means an infestation of 5 acres or less.

Source. #6852 eff 9-5-98

Env-Ws 1302.09 "Maintenance project" means the short-term control of an infestation of exotic aquatic weeds by treating the weeds directly rather than treating the cause of the infestation.

Source. #6852 eff 9-5-98

Env-Ws 1302.10 "New infestation" means an infestation that was not previously reported to the department.

Source. #6852 eff 9-5-98

Env-Ws 1302.11 "Restricted use area" means a marked area or marked areas of a water body where infestations of exotic aquatic weeds have been delineated in accordance with Env-Ws 1304, which is closed to entry by boaters, anglers, or other water users and their equipment, except in emergency situations where property or human life is endangered.

Source. #6852 eff 9-5-98

Env-Ws 1302.12 "Surface waters of the state" means "surface waters of the state" as defined by RSA 485-A:2, XIV, namely, "streams, lakes, ponds and tidal waters within the jurisdiction of the state, including all streams, lakes or ponds bordering on the state, marshes, water courses and other bodies of water, natural or artificial."

Source. #6852 eff 9-5-98

PART Env-Ws 1303 PROHIBITED EXOTIC AQUATIC WEEDS AND EXEMPTIONS

Env-Ws 1303.01 Prohibitions and Designation. The following exotic aquatic weeds, identified in "A Manual of Aquatic Plants" by Norman C. Fassett and "Aquatic and Wetland Plants of Northeastern North America" by Garrett Crow and C. Barre Hellquist, both copyrighted by The University of Wisconsin Press, shall be prohibited from being offered for sale, distributed, sold, imported, purchased, propagated, transported or introduced in the state, pursuant to RSA 487:16-a, because they pose a substantial threat to native species in the state:

- (a) *Myriophyllum heterophyllum*, commonly referred to as variable milfoil;
- (b) *Myriophyllum spicatum*, commonly referred to as Eurasian milfoil;
- (c) *Cabomba caroliniana*, commonly referred to as fanwort;
- (d) *Hydrilla verticillata*;
- (e) *Trapa natans*, commonly referred to as water chestnut;
- (f) *Myriophyllum aquaticum*, commonly referred to as parrot-feather;
- (g) *Potamogeton crispus*, commonly referred to as curly leaf pondweed;
- (h) *Lythrum salicaria*, *L. virgatum*, *L. alatum* and their cultivars, commonly referred to as purple loosestrife;
- (i) *Phragmites australis* or *P. communis*, commonly referred to as common reed;
- (j) *Egeria densa*, commonly referred to as Brazilian elodea;
- (k) *Hydrocharis morsus-ranae*, commonly referred to as frogbit;

- (l) *Butomus umbellatus*, commonly referred to as flowering rush;
- (m) *Najas minor*, commonly referred to as European naiad; and
- (n) *Nymphoides peltata*, commonly referred to as yellow floating heart.

Source. #6852 eff 9-5-98

Env-Ws 1303.02 Exemptions for Transportation. Transportation of any exotic aquatic weeds on any road or highway in the state shall be exempt from the transportation prohibition of RSA 487:16-a, if the following are true:

- (a) It is for disposal as part of a harvest control activity under the supervision of the department;
- (b) It is for the purpose of identifying a species or reporting the presence of a species, and the exotic aquatic weed is in a sealed container; or
- (c) It will be disposed of after removal from recreational watercraft and equipment, such as trailers, motors, fishing equipment, or diving gear.

Source. #6852 eff 9-5-98

Env-Ws 1303.03 Acceptable Means of Disposal.

- (a) Any exotic aquatic weed shall be immediately disposed of away from water or moist areas where it might survive.
- (b) Acceptable means of disposal shall include but not be limited to:
 - (1) Burning;
 - (2) Land filling;
 - (3) Disposing in a trash container;
 - (4) Desiccating; and
 - (5) Composting, if applied away from surface waters.

Source. #6852 eff 9-5-98

Env-Ws 1303.04 Exemptions for Preserved Specimens. Pursuant to RSA 487:16-a, the prohibitions listed in Env-Ws 1301.01 shall not apply to exotic aquatic weeds in the form of herbaria or other preserved specimens.

Source. #6852 eff 9-5-98

Env-Ws 1303.05 Exemptions for Research or Education. Pursuant to RSA 487:16-a, the prohibitions listed in Env-Ws 1303.01 shall not apply to exotic aquatic weeds being used in a controlled environment, such as in a laboratory for research or for educational display.

Source. #6852 eff 9-5-98

Env-Ws 1303.06 Exemptions for Field Experimentation. Pursuant to 487:16-a, the prohibitions listed in Env-Ws 1303.01 shall not apply to remedial actions in the field for the purpose of finding control mechanisms involving exotic aquatic weeds, which, based on the proposed use and safeguards for containment, will minimize the risk of harm to natural resources or their use in the state.

Source. #6852 eff 9-5-98

Env-Ws 1303.07 Notification Requirement.

(a) Any person other than an employee of the department acting in his or her official capacity, who participates in any of the above exempted activities, Env-Ws 1303.02 and Env-Ws 1303.04 through Env-Ws 1303.06, shall notify the department prior to or within 24 hours after performing such activity, by calling 271-3503.

(b) Notification is not required for disposal after removal from recreational equipment pursuant to Env-Ws 1303.02(c) and Env-Ws 1303.03.

Source. #6852 eff 9-5-98

PART Env-Ws 1304 IDENTIFICATION, NOTICE, DE-LISTING AND MARKING OF RESTRICTED USE AREAS

Env-Ws 1304.01 Designation and De-listing of Restricted Use Areas.

(a) The commissioner, in consultation with the executive director of the fish and game department and the director of the safety services division of the department of safety, shall designate as a restricted use area any area that contains a limited infestation of exotic aquatic weeds. Such areas shall include new infestations, infestations in areas with the high risk of fragmentation, or areas in waterbodies with previously documented infestations, but where treatments or management practices have removed all but a small area of exotics that can be contained with the establishment of a restricted use area, until such time that other management practices can remove the remainder of the population.

(b) After designation, a restricted use area shall be in place until the area is no longer infested subject to the criteria in (a) above, or until a period of 3 years has expired since the time of designation.

(c) When an infestation has been eradicated or cannot be successfully treated or managed within the 3-year time limit, or the 3-year time limit has been reached, the commissioner, in consultation with the executive director of the fish and game department and the director of the safety services division of the department of safety shall evaluate the designated site to determine whether they will de-list the restricted use area or extend the restriction on the area.

(d) The commissioner shall issue press releases to the newspapers in the towns surrounding the water body(ies) in which a restricted use area is designated or de-listed.

Source. #6852 eff 9-5-98; amd by #7570, eff 10-6-01

Env-Ws 1304.02 Notification Protocol. The commissioner, in consultation with the executive director of the fish and game department and the director of the safety services division of the department of safety, shall notify the public when a restricted use area has been designated or de-listed and when buoys are installed or removed.

Source. #6852 eff 9-5-98

Env-Ws 1304.03 Notice of Restricted Use Areas.

- (a) The department shall post signs warning of a restricted use area in accordance with Env-Ws 1304.04.
- (b) The commissioner shall publish the names of identified water bodies which contain restricted use areas in a press release.
- (c) Notice shall include the following information:
 - (1) The town(s) in which the water body containing the restricted use area is located;
 - (2) The name of the water body containing the restricted use area;
 - (3) The specific location of the infestation within the water body;
 - (4) The type of infestation; and
 - (5) The general dimensions of the restricted use area.

Source. #6852 eff 9-5-98

Env-Ws 1304.04 Delineation and Markers for Restricted Use Areas. The department or its designee shall mark restricted use areas using buoys and signs as specified below:

- (a) A minimum of 3 buoys and/or signs shall be used to delineate a restricted use area;
- (b) The buoys shall be placed not more than 300 feet apart;
- (c) The buoys shall be connected by rope with small floats every 8 feet;
- (d) At least 2 buoys and/or signs shall be placed at or near the shoreline to delineate a restricted use area if the area is adjacent to the shore; and
- (e) Buoys shall be removed at the end of each growing season, unless removed sooner pursuant to the de-listing process.

Source. #6852 eff 9-5-98

Env-Ws 1304.05 Type of Warning Buoy. The buoy which warns of a restricted use area shall:

- (a) Be a standard state danger buoy;

(b) Be white and international orange in color;

(c) Have an orange diamond symbol with an X through it; and

(d) Read as follows: "Restricted Use Area, pursuant to RSA 487. NH Dept. of Environmental Services 603-271-3503."

Source. #6852 eff 9-5-98

Env-Ws 1304.06 Marking of Restricted Use Areas by Municipalities.

(a) Any municipality with a similar method of marking restricted use areas within municipal water supplies may request the department to approve the method, in lieu of Env-Ws 1304.04, by submitting a request in writing to the department.

(b) The department shall grant authorization to a municipality to mark municipal water supplies if the method of marking to be used by the municipality is equivalent or more stringent than the method identified in Env-Ws 1304.04.

Source. #6852 eff 9-5-98

Env-Ws 1304.07 Navigation Prohibition. Subject to Env-Ws 1304.08, no person or equipment, including boaters, anglers, or other water users, or private or commercial watercraft of any type, shall enter a restricted use area except in emergency situations where property or human life is endangered.

Source. #6852 eff 9-5-98

Env-Ws 1304.08 Lake Access. If an infestation occurs at an access point to a marina, private residence, or public or private access ramp, a bottom barrier shall be put over the infestation to keep it from spreading and the access point shall be left open.

Source. #6852 eff 9-5-98

Env-Ws 1304.09 Signs. The department shall post signs at marinas or public or private access sites notifying the public of restricted use areas and the signs shall:

(a) Be at least 8 ½ by 11 inches in size; and

(b) Read as follows: "This buoy marks a RESTRICTED USE AREA on this water body, designated pursuant to RSA 487:17. Please help prevent the spread of exotic aquatic plants by staying out of these areas."

Source. #6852 eff 9-5-98

PART Env-Ws 1305 MAINTENANCE AND REMOVAL OF BUOYS

Env-Ws 1305.01 Responsible Agency. The department shall maintain, inspect and remove buoys as follows:

(a) The department shall install buoys during weekday office hours; and

(b) The department shall remove the buoys at the end of each growing season, unless removed sooner pursuant to the de-listing process.

Source. #6852 eff 9-5-98

Appendix

Provision of the Proposed Rule	Specific State Statute which the Rule is Intended to Implement
Env-Ws 1304.01(a)	RSA 487:17, II(d)

Appendix Two

Chronology of Key Events: 1981-2005

NHDES Exotic Aquatic Species Program Chronology of Events: 1981-1998

1981

- The exotic aquatic weed control legislation (RSA 487-17 formally RSA 149-F:3) became law on August 22, 1981.
- Fifty thousand brochures describing the exotic aquatic weed control program were distributed to boat license agents, state rest areas, marinas and lake associations.
- Waterproof posters depicting how to stop the spread of exotic weeds to other waterbodies were designed and distributed by DES personnel. Posters were placed at high use boat launching facilities throughout the state.
- A television commercial describing the exotic weed control program aired on Channel 9, in Manchester.
- Articles on exotic weed control were placed in several of the states most read newspapers.
- Personnel from this department discussed the exotic weed control problem at many lake association meetings.
- Several exotic weed complaints were field investigated by DES personnel.

1982

- The Citizen Aquatic Weed Control Advisory Committee was formed.
- Educational material was distributed throughout the state to keep the public up to date on milfoil control. Boat license agents, state rest areas, boat marinas and lake associations received this material.
- Matching funds were awarded to Smith Cove Lake Association for mechanical harvesting of milfoil in Lake Winnepesaukee.
- Fifty lakes were surveyed for the presence of exotic weeds.
- A new infestation of milfoil was discovered in the outlet of Lake Waukegan by DES personnel. It was successfully eradicated with an aquatic herbicide.

1983

- The Smith Cove Lake Association in Gilford and the Wolfeboro Conservation Commission were awarded matching fund grants for the harvesting of milfoil in Lake Winnepesaukee.
- Educational material was distributed throughout the state.
- Fifty lakes were surveyed for exotic weed life by DES personnel.
- Several complaints or inquiries pertaining to exotic weeds were either field investigated or handled through correspondence.
- DES personnel presented several talks on weed control at lake association meetings during the summer.
- Correspondence to other states and countries experiencing exotic aquatic weed

problems was initiated in order to obtain new or existing aquatic weed control techniques.

1984

- The Towns of Alton, Gilford, Meredith and Wolfeboro were awarded matching grants to mechanically harvest exotic milfoil in Lake Winnepesaukee.
- The West Alton Marina was awarded a matching grant to apply aquatic herbicide to their dock area to control milfoil.
- Educational material was distributed throughout the state.
- Fifty exotic weed surveys were performed throughout the state.
- A new infestation of milfoil was hand pulled at the boat launching facilities on Crescent Lake in Wolfeboro. SCUBA equipment was utilized during the operation.
- Several aquatic weed complaints were field investigated by DES personnel.
- Personnel from DES monitored a lake drawdown and dredging project that was undertaken to control exotic fanwort in Millville Lake in Salem.
- Several newspaper articles were published state wide pertaining to exotic aquatic weed control. The Boston Sunday Globe did an extensive feature story on exotic milfoil in Lake Winnepesaukee. "The Laker" in Wolfeboro printed an excellent article explaining the problem.
- DES personnel addressed the exotic plant control problems at lake association meetings during the summer.

1985

- Funding for exotic weed control was suspended due to a previously unknown legislative footnote. No weed control projects were funded this year.
- Fifty exotic weed surveys were performed on lakes throughout the state.
- Millville Lake was inspected for Cabomba growth following a dredging operation.
- Educational material was distributed throughout the state.
- DES SCUBA team removed a small patch of milfoil from Crescent Lake boat landing area in Wolfeboro.
- DES personnel addressed aquatic weed problems at lake association meetings.

1986

- Aquatic weed control program funds became available due to legislative action. However, no projects were funded that summer due to funds not being available in time.
- Fifty exotic weed surveys were undertaken during the summer months.
- Two papers entitled "A Review of Current and Experimental Methods for the Control and Management of Aquatic Milfoil" and "Answers to Questions Concerning Aquatic Milfoil in New Hampshire Surface Waters" were written for

distribution to the public.

- Educational material was distributed to lake associations, boat marinas, and the general public.
- Millville and Crescent Lakes were intensely surveyed for exotic weeds.
- Personnel from DES addressed aquatic weed problems at lake association meetings during the summer months.

1987

- Matching funds were awarded to the Town of Alton to undertake a milfoil dredging project in Lake Winnepesaukee.
- SCUBA divers removed small milfoil infestations at the Crescent Lake boat landing in Wolfeboro and in a section of the Winnepesaukee River in downtown Laconia.
- Two mechanical harvesting projects were planned for the summer. However, town officials could not obtain the necessary local funding to match the state's share.
- An attempt to dredge 10,000 square feet of milfoil and bottom substrate was canceled in Opechee Lake in Laconia. Heavy duty equipment became mired down in the deep muds near the milfoil infestation.
- Educational material was distributed throughout the state.
- Intensive exotic weed surveys were undertaken in seventeen lakes and ponds near Lake Winnepesaukee. These ponds were considered to be vulnerable to a milfoil infestation.
- Fifty exotic weed searches were performed on other state lakes.
- A grant of \$45,000 was awarded to the University of New Hampshire in Durham for Research on how to control exotic weed growth. Research was conducted in Back Bay in Wolfeboro on Lake Winnepesaukee.
- Private citizens participating in the New Hampshire State Assisted Lay Monitoring Program were instructed to report the sighting of any new weed growths in their respective lakes and ponds. The manual used by these lay monitors has a special section on exotic weed life.
- Millville Lake in Salem was checked for any regrowth of fanwort after a dredging operation. There has been no sign of fanwort in the lake to this date.
- A news release concerning exotic weeds and their potential spread to other lakes was distributed throughout the state media system.
- DES personnel participated in a workshop entitled "Nuisance Aquatic Weeds in New England". This workshop was sponsored by the New England Association of Environmental Biologists.
- A 4" x 6" educational handout card depicting how exotic weeds can be spread to other lakes through boating activity was distributed to boat owners during registration of their respective boats.

1988

- The state initiated a "Weed Watcher Program" for lake residents. Volunteer weed watchers were given instruction kits which taught them how to look for exotic weeds in their respective lakes. Any weeds that were suspected to be milfoil or fanwort were submitted to the DES Biology Bureau for verification. The program was well received by the public.
- Fifty exotic weed surveys were performed during the summer as well as many field investigations of exotic weed complaints.
- Matching funds were awarded to the Smith Cove Lake Association for the harvesting of exotic milfoil in Lake Winnepesaukee.
- Benthic barriers were installed in Lake Opechee to control a small area infested with milfoil.
- DES personnel assisted on a private dredging project to control milfoil in Lake Opechee.
- Hand pulling of small infestations of milfoil were undertaken in Flints Pond, Crescent Lake, Lake Opechee and the Winnepesaukee River.
- A boat inspection program to detect "stowaway" exotic plant fragments was initiated during the summer of 1988. Participating towns were given \$2.00 per boat inspection. A questionnaire was also filled out by each person going through the inspection. Educational material was handed out to all boaters using these inspection launch sites. Towns participating were Meredith, Alton, Center Harbor (Winnepesaukee) and Sunapee (Lake Sunapee).
- Exotic milfoil was found in Turkey Pond, Concord and Flints Pond in Hollis during routine exotic weed surveys.
- Several boat docking facilities and launch sites were checked for the presence of exotic weeds during the summer.

1989

- A matching grant was awarded to the Locke Lake Association in Barnstead for the purpose of chemically treating 40 acres of exotic milfoil. The chemical called Diquat was used to control the milfoil.
- Lake shore residents along the northwestern section of Opechee Lake were awarded a matching grant to dredge milfoil and the bottom muds that sustain the exotic weeds. This was undertaken during a fall drawdown of the lake.
- St. Paul's School, located in Concord, was awarded a matching grant to mechanically harvest and hydrorake milfoil in Library Pond and Lower School Pond. The grant also provided for the application of lime to selected milfoil beds to determine if there was a reduction in biomass. The lime experiment was intended to supplement the work previously undertaken on Lake Winnepesaukee in 1987.
- Fifty lake surveys were performed which included intensive searches for exotic

weeds.

- Several complaints were investigated relative to sightings of exotic plants.
- A matching grant was awarded to lake residents in Paugus Bay in Laconia, for the purpose of controlling milfoil with a mechanical weed harvester. Boat movement through the area was impeded by the large amounts of exotic milfoil.
- Milfoil was confirmed to be growing in Contoocook Lake in Rindge. DES biologists spent a whole day mapping the extent of the problem in Contoocook Lake. Several meetings were scheduled between lake association residents and DES biologists to determine a course of action to curtail the milfoil infestation. After discussing the problem thoroughly with all concerned, it was decided that the use of an aquatic herbicide would be the most efficient milfoil management tool available. During the winter months, plans were drawn up, permits obtained and a weed control firm was hired to complete the plan.

1990

- Exotic milfoil was found in Northwood Lake during a routine inspection. Initially it was thought to be a small localized infestation. A SCUBA team revealed later that the milfoil encompassed a larger area not seen during the boat inspection. Since this was a pioneer infestation of milfoil it was decided that the best course of action to control the problem would be through the use of the herbicide called Diquat. The entire lake was surveyed for the presence of milfoil towards the end of the summer. The survey revealed that the initial infestation had spread to about 75 acres of the lake shore. Invitation for bids to control this problem were sent out and the necessary permits were obtained with a target date set for the spring of 1991 for the application of the chemical Diquat. DES funded 100% of the project.
- Contoocook Lake in Rindge received a matching grant from DES to treat 70 acres of milfoil. Aquatic Control Technology Inc. was selected to treat the lake with liquid Diquat. Milfoil had entered the lake about three to four years earlier but was not brought to the state's attention until 1989.
- A small patch of milfoil (50'x10') was found at the Mast Landing boat launching site in Crescent Lake, Wolfeboro. To prevent boats from transporting the milfoil into nearby Wentworth Lake, DES personnel used Aqua Screen, a bottom barrier, to smother the plants. The screen effectively killed the milfoil and is still in place to prevent further plant growth.
- Fifty lake water quality surveys were completed during the summer. During the survey aquatic weeds were noted.

1991

- During the month of June, approximately 75 acres of exotic milfoil in Northwood Lake was treated with the herbicide called Diquat. Since the milfoil was new to the lake system, the entire cost of the weed control operation was funded by the

Department of Environmental Services (DES).

- The Fish Cove Lake Association and Mt. View Marina, both located on Lake Winnepesaukee, had severe infestations of exotic milfoil that precluded the recreational and commercial value of the waters. They each received matching grants to fund the application of the herbicide Diquat. Crescent Lake in Wolfeboro, also received a grant to treat 35 acres of milfoil with Diquat.
- A "weed watcher" on Lake Winnisquam notified DES that exotic milfoil was found in the northern section of the lake. DES personnel confirmed the milfoil sighting and sent two SCUBA divers to cover the small milfoil infestation with Aqua Screen. Any "straggler" plants were hand pulled by the SCUBA divers.
- A "weed watcher" from Lees Pond in Moultonboro noticed that some stands of milfoil in the pond were being eaten by some unknown animal. Closer inspection by DES personnel revealed that an aquatic moth was responsible for the apparent decline in the milfoil biomass. The aquatic moth was subsequently identified as Paraponyx allionealis. DES SCUBA divers observed and monitored the progress of the insect and mapped out the areas affected by the insect.
- A new sign warning lake residents that milfoil was growing in their respective lakes was designed and placed at the milfoil infested lakes, usually at the boat launching facility.
- Fifty lakes were surveyed for the presence of milfoil or other exotic weeds.
- DES personnel presented several talks on exotic weed control at lake association meetings during the summer months.
- Professional divers were hired to hand pull a new infestation of milfoil in Round Cove on Lake Winnepesaukee. This was a fifty-fifty match with the local residents. DES biologists monitored the project.

1992

- Round Cove located on Lake Winnepesaukee was given a matching grant to control a small encroachment of milfoil. A weed control firm was hired to apply liquid Diquat to the 5 acre cove. Mt. View Marina in Gilford was also given a grant to chemically control the obnoxious milfoil that interfered with boating activities.
- DES and the Town of Wolfeboro provided money for Brewster Academy to study the aquatic moth currently eating milfoil in Lees Pond in Moultonboro. The study examined the fundamental characteristics of the aquatic moth, such as food preferences, biomass consumption, and the life cycle. These studies were performed in Back Bay in Wolfeboro and Lees Pond. Initial tests performed in "live cages" showed that the insects will decrease milfoil if in sufficient numbers. DES personnel assisted the researchers at Brewster Academy during the summer.
- A new exotic weed Myriophyllum spicatum was discovered growing in Mountain Pond in the Town of Brookfield. Otherwise known as Eurasian milfoil, this plant can spread very quickly to other ponds. A decision was made to drain the small

shallow pond in an attempt to freeze and dry out the hardy plants. The beaver dam holding back the lake was breached during the fall. The plan is to let the pond stay down for at least two years. Several trips were made to the pond to insure that local beaver were not plugging the opening in the dam. As a last resort the pond may need a spot treatment of herbicides to insure that it does not spread to other nearby waterbodies.

- Exotic milfoil was found growing in Lake Winnisquam in the Towns of Tilton and Belmont. The combined total affected area was 7.81 acres. Since this was a new infestation of exotic weeds, the state was mandated to fund 100% of the weed control process. The decision was made to treat the two small areas with the herbicide 2,4-D. A request for bids to treat the two areas was sent out during the fall of 1992. A contractor was hired to obtain all the necessary permit from the Division of Pesticide Control and to apply the granular 2,4-D to the sites in Lake Winnisquam. Unfortunately, the project ran into difficulties over the issue of a nearby business using the lake as a drinking water source. The treatment area was too close to the drinking water source. The project was denied by the Division of Pesticide Control.
- The Wentworth Lake association applied for a matching grant from the state to chemically treat thirty five acres of milfoil in nearby Crescent Lake, Wolfeboro. This project also was denied due to a drinking water issue and the use of the aquatic herbicide 2,4-D.
- As in previous years, educational material was distributed to the public, exotic weed signs were placed at boat launching sites and talks relating to the exotic weed problem were given by DES personnel. Also, many weed specimens were submitted to DES for identification. Fifty weed surveys were performed on selected lakes in conjunction with a survey of the current water quality status of each waterbody.

1993

- The following were awarded matching grants from the state for the purpose of controlling exotic milfoil:
 - a. Mt. View Marina - Gilford; herbicide; 2,4-D
 - b. Lake Shore Park - Gilford; herbicide; 2,4-D
 - c. West Alton Marina - Alton; herbicide; 2,4-D
 - d. Contoocook Lake Association - Rindge/Jaffrey; herbicide; Diquat

Each site was severely infested with exotic milfoil to the point that recreational and commercial activities were impaired.

- "Weed Watchers" found three more lakes that harbored suspected stands of milfoil. Lower Suncook Lake, Lake Wentworth and Broad Bay were the latest victims of the milfoil encroachment. DES personnel covered the small stand of milfoil in Lake Wentworth with a benthic bottom barrier. The barrier physically constrains the weeds and ultimately smothers the plants within a month. Suncook Lake in Barnstead had scattered stands of milfoil near the outlet section of the lake. DES SCUBA divers placed bottom barriers on the milfoil. Each of the 5 stands of milfoil took about 300 square feet of bottom barrier. Any separately growing plants were hand pulled by the divers. During the fall drawdown of Lower Suncook Lake DES personnel patrolled the affected area searching for new milfoil growths missed during the summer. Any patches larger than 25 square feet were covered with barrier while "straggler" plants were individually hand pulled. The milfoil in Broad Bay (Bay Marina) seems to be confined to an area not larger than two acres. Local residents concerned about the problem are hand raking and pulling the milfoil plants. This area will be looked at more extensively next spring in order to decide what type of management approach will be undertaken to control the problem.
- In 1991 Northwood Lake was chemically treated to control exotic milfoil. The plants came back during the summer of 1992 and 1993. After a meeting with the lake association and DES personnel, it was decided to draw down the water in Northwood below the normal winter drawdown level. It is hoped that a cold winter will kill the newly exposed plant life.
- Officials from the Lake Wentworth Lake Association found milfoil growing in a small cove near Albee Beach in Wolfeboro. They notified DES officials of its presence and location on the lake. The plants did not have all the necessary taxonomic features needed to correctly identify the milfoil to species. However, since the milfoil was suspected to be an exotic species, it was decided that something should be done to ensure that it does not spread to the rest of the lake. DES personnel decided to cover the small area with bottom barrier. Approximately 1500 square feet of bottom barrier (Aqua Screen) were installed over the milfoil plants.
- Each year a Volunteer Lake Monitoring Workshop is held at DES headquarters in Concord. This year an aquatic weed workshop was given as well as an overview of the exotic weed program. These two programs were well attended by lake volunteers.
- Lake association members from New York state concerned about the current milfoil spread in their state asked a representative of DES to give a talk on the New Hampshire exotic weed program. They are trying to get a similar program started in New York.
- A representative from DES gave a major exotic weed presentation at the annual "Bass Master" state chapter meeting held in Concord. Major emphasis was given to cleaning weeds from boats during the "Bass Master" competitions held at many lakes during the summer months.
- An exotic weed control talk was given at the annual "Lakes Congress" held at St.

Paul's School in Concord. About one hundred representatives from the many lakes of New Hampshire attended the conference.

- A grant was given to Brewster Academy in Wolfeboro to do follow up studies on the insects that eat milfoil. DES personnel assisted on this project by supplying a dive team to perform some of the experiments. Local lake association people also got involved on this project.
- Approximately 300 weed watcher kits were given out to various lake associations throughout the state. Requests for the "kits" were received from other states.
- DES personnel periodically checked on the status of the Mountain Pond drawdown in Brookfield. Occasionally, beaver would attempt to plug up the breach in the dam. The mini drought experienced this summer took its toll on the exposed Eurasian milfoil plants. Once the plants dried up, land plants took their place.
- NH Fish & Game became the lead agency for the "Statewide Public Access Program." They have agreed to place DES exotic weed warning signs at all their new and existing public access points.
- Currently, a new exotic weed sign is being developed for distribution during the summer of 1994.
- Several routine exotic weed complaints were field investigated by DES personnel. Many suspect weeds were sent to the DES Limnology Center for identification.
- Fifty lake surveys to determine current water quality status were performed by DES biologists during the summer. A weed survey was undertaken during the survey. A search for exotic weed species was also performed on each lake or pond.
- Problems associated with milfoil and other exotic plants in NH generated several newspaper articles during the summer. This "free publicity" helped get the word out to the public informing them to be careful not to spread exotic weeds to other lakes and ponds through boating activities.
- A weed watcher from the northern section of Lake Winnisquam notified DES biologists that a small patch of milfoil had appeared in one of the coves. SCUBA divers successfully hand-pulled the plants before they spread to other sections of the lake.

1994

- Pioneer infestations of exotic milfoil were found in Lake Waukewan, Meredith; Cheshire Pond, Jaffrey; Broad Bay, Freedom; and Silver Lake in Tilton.

Lake Waukewan, Meredith -DES biologists found approximately 1.5 acres of the exotic milfoil in the outlet/canal section of Lake Waukewan during a routine water quality inspection. This same general area had milfoil in 1981 and was successfully treated and controlled with a chemical herbicide in 1982.

Cheshire Pond, Jaffrey -A resident on Cheshire Pond in Jaffrey reported sighting milfoil in a beach area. A DES biologist confirmed the milfoil to be exotic. The milfoil probably floated downstream from nearby Contoocook Lake ultimately taking hold in the pond. A temporary drawdown of the pond was initiated during the month of December in an attempt to freeze the milfoil plants.

Silver Lake, Tilton - Exotic milfoil was found in Silver Lake in Tilton by the University of New Hampshire lay monitoring officials. DES responded to the problem quickly by hand pulling the plants and digging up the remaining plants during a fall drawdown of the lake. This site will be inspected in the spring of 1995 for signs of regrowth.

Broad Bay, Freedom -DES biologists had trouble identifying the milfoil at this site in 1993 because the plant did not exhibit flowers which are critical to a positive identification. However, in 1994 flowers did appear and the plant was identified as exotic milfoil. This site will be chemically treated in 1995.

- Three matching grants were awarded to lake associations in 1994 for the purpose of exotic weed control. They were as follows:

<u>Association</u>	<u>Lake</u>	<u>Town</u>	<u>Type Exotic</u>	<u>Control Method</u>
a. Locke Lake Assoc.	Locke Lake	Barnstead	milfoil	chemical
b. Meredith Yacht Club	Winnepesaukee	Meredith	milfoil	chemical
c. St. Pauls School	Turkey Ponds	Concord	milfoil	mechanical harvesting

- DES biologists performed several underwater exotic weed surveys with the aid of SCUBA equipment. These surveys were done to get an accurate assessment of the milfoil infestations.
- A new sign designed to educate boaters was made and placed at many boat launches throughout the state.
- Northwood Lake in Northwood was lowered in November so that the state could replace the old dam. The lake was drawn down all winter and did slow down the milfoil growth along the shoreline.
- Several informational talks were presented at lake association meetings by DES biologists. A radio talk show on exotic weeds was aired in Lebanon, while a local TV station did a major news segment on the exotic weed control program.
- DES personnel went to a meeting in Vermont to discuss new methods of controlling exotic weeds.
- Several hundred "weed watcher kits" were requested by the public. This volunteer program has been very successful over the past few years.
- Several suspected exotic weed sightings by weed watchers or other concerned lake residents were investigated by DES biologists. Many samples were sent to the Limnology Lab for identification.

- Fifty more exotic weed surveys were performed during the summer. These surveys supplement the weed watcher efforts performed by volunteers.
- Five milfoil contracts were put out to bid in 1994. These weed control projects will occur during the spring of 1995.
- Mountain Pond in Brookfield, which originally had Eurasian milfoil is still empty. There is no sign of any milfoil in the small stream that flows through the empty pond.

1995

- The outlet section of Lake Waukegan in Meredith was treated with the herbicide called Aqua Kleen. Aquatic Control Technology, Inc. of Northborough was hired by DES to undertake the project. If the milfoil had not been controlled there was a good chance it may have spread through the rest of the lake. It would have been impossible to treat the main lake since the Town of Meredith uses the lake for drinking water. An inspection of the treatment area with SCUBA gear did not reveal any milfoil plants. The treatment was a success.
- Lower Suncook Lake in Barnstead had six acres of milfoil treated with the herbicide called Reward. Lycott Environmental Research, Inc. of Southbridge Massachusetts was hired by DES to perform the treatment.
- Crescent Lake in Wolfeboro was also treated with the herbicide called Reward. An inspection of the treated area in the fall revealed no milfoil. To date treatment efforts have kept milfoil from invading the main section of nearby Lake Wentworth.
- Mountain Pond in Brookfield is still drained. Still no signs of Eurasian milfoil.
- Eurasian milfoil was found growing in the Connecticut River in Charlestown. A large boat launching facility on the Vermont side of the river is used by fishermen from both states. Vermont officials were notified of the milfoil. They posted warning signs near the launch site. Leaflets informing the public about the milfoil were handed out to the boating public at a toll booth as they crossed from New Hampshire into Vermont.
- A “weed watchers wheel” was developed to distribute to the public to aid them in their search for exotic weeds. The wheel accompanied the standard “weed watcher kit” used by lake monitors.
- The proposal to treat Broad Bay in Freedom with herbicides was terminated due to time constraints and permitting problems.
- Contoocook Lake Association received a matching grant from the state to chemically treat small areas of milfoil. The herbicide called Diquat was used in this project.
- Several milfoil talks were given to lake associations during the summer.
- Benthic barriers were installed in a small cove on Wentworth Lake to control a small stand of milfoil.
- Milfoil was hand pulled in Lower Suncook Lake by SCUBA divers from DES.
- Eight proposed herbicide applications for the purpose of milfoil control were submitted to the Governor and Council for approval. The projects were as

follows:

- a. Broad Bay, Freedom
 - b. Lakeshore Park, Gilford
 - c. Mt. View Marina, Gilford
 - d. West Alton Marina, Alton
 - e. Winnisquam Lake, Belmont
 - f. Silver Lake, Belmont
 - g. Cobbetts Pond, Windham
 - h. Fish Cove, Meredith
- Exotic milfoil was found at Claire's Boat Landing on Lake Massabesic in Auburn. This lake is Manchester's water supply. Benthic barriers were placed on a large portion of the milfoil. The use of herbicides was not allowed due to the drinking water status of the lake. Manchester Water Works personnel moved the benthic barriers to other milfoil sites as needed.

1996

- Eight herbicide applications to control milfoil occurred during the month of June. They are as follows:
 - a. Broad Bay, Freedom
 - b. Lakeshore Park, Gilford
 - c. Mt. View Marina, Gilford
 - d. West Alton Marina, Alton
 - e. Winnisquam Lake, Belmont
 - f. Silver Lake, Belmont
 - g. Cobbetts Pond, Windham
 - h. Fish Cove, Meredith
- Two new infestations of milfoil were confirmed by the DES staff. Captain Pond in Salem and Lake Massasecum in Bradford now possess the nuisance weed.
- SCUBA divers checked Lake Waukegan for any signs of milfoil regrowth one year after it was treated. No milfoil plants were observed during the dive.
- Milfoil was discovered growing in the northern end of Lake Winnisquam.
- A milfoil education display was presented at the Fish and Game Department "Discover Wild New Hampshire Day."
- A similar display was also presented at "Celebrate Your Lakes Day" held this summer in Meredith.
- Milfoil informational talks were given throughout the summer at many lake association meetings.
- A talk was given to the Fish and Game Department volunteer fishing instructors on how to look for exotic weeds throughout the state.
- Ken Warren attended a National Weed Control Conference held in Burlington Vermont in July. Several papers on new promising control techniques were presented.
- Benthic barriers were placed on a small infestation in Lake Winnisquam.
- Mountain Pond in Brookfield was checked for any regrowth of Eurasian milfoil. No plants were found during the inspection.

1997

- Six herbicide applications were performed in the spring to control nuisance growths of exotic aquatic plants:
 - a. Northwood Lake, Northwood
 - b. Lake Winnepesaukee, Mountain View Marina, Gilford
 - c. Lake Winnepesaukee, Meredith Bay, Meredith
 - d. Lake Massasecum, Bradford
 - e. Lake Winnepesaukee, Krainwood Shores, Moultonboro
 - f. Locke Lake, Barnstead
- Benthic barriers were placed in Heath Bog of Lake Wentworth, Wolfeboro, Lake Massabesic in Auburn, Lake Massasecum Bradford, as well as in small localized areas in other lakes.
- A new infestation of milfoil was documented at Claire's Boat Landing on Lake Massabesic in Auburn, and Powder Mill Pond in Hancock.
- SCUBA divers inspected several small infestations of milfoil and hand-pulled plants where they were encountered in low densities.
- Several displays were presented at summer events and festivals including "Celebrate Your Lakes Day", and "Discover Wild New Hampshire Day."
- Informative presentations were given at a number of lake association meetings throughout the summer.
- HB 181 was passed prohibiting a number of activities associated with exotic aquatic plants.

1998

- RSA 487:16-a went into effect on January 1, 1998. This new law prohibits the sale, distribution, importation, purchase, propagation, transportation, or introduction of 14 listed exotic aquatic plants in New Hampshire. The new statute also allows for the designation of restricted use areas on waterbodies.
- On September 5, 1998 new rules were enacted pursuant to RSA 487:16-a.
- Benthic Barriers were placed in Lake Winnepesaukee in Meredith, Lake Wentworth in Wolfeboro, Contoocook Lake in Jaffrey, Hopkinton Lake in Hopkinton, Lake Massabesic in Auburn, and Lake Massasecum in Bradford, as well as in small places in an additional 2-3 lakes.
- Maintenance hand-pulling activities took place at a number of lakes with new and existing milfoil infestations.
- The following herbicide applications were performed during the Spring:
 - a. Forest Lake, Winchester
 - b. Captains Pond, Salem
 - c. Sunrise Lake, Middleton
 - d. Contoocook Lake, Jaffrey
 - e. Lake Winnepesaukee, Gilford
 - f. Lake Winnepesaukee, Moultonboro

- g. Lake Winnepesaukee, Tommy Cove, Meredith
- A number of summer lake festivals were attended by the Exotic Species Coordinator, including "Celebrate Your Lakes Day," "Naturally Newfound," "Discover Wild New Hampshire Days," and Keene State College "Solarfest".
- Several presentations were given to towns and lake associations throughout the state on exotic aquatic plants.
- Exotic species signs which are posted at boat launches throughout the state were revised to include the changes in legislation associated with exotic plants.
- A number of milfoil control activities were conducted this summer at Lake Massasecum in Bradford. Benthic barriers were installed, a restricted use area was established in the north cove, and a net was placed across the surface of the water (vertically in water column) to trap floating fragments of milfoil.
- 500 specimens of variable milfoil (*Myriophyllum heterophyllum*) were sent to the Army Corps of Engineers, Waterways Experimental Station in Vicksburg, MS for research on control methods. Garlon 3-A, a new herbicide that is thought to be more effective and environmentally sound than 2,4-D, was used to treat the plants. More extensive research will be conducted this spring.

1999

- Eurasian milfoil found in Lake Mascoma in Enfield. Numerous diving operations were conducted to hand remove the milfoil.
- 'Suspicious patches of milfoil found in Horseshoe Pond in Merrimack and in Belleau Lake, Wakefield. Plants did not flower so positive identifications were not made. Plan to investigate again in 2000.
- Nine herbicide applications were conducted this year. Most were in various portions of Lake Winnepesaukee. Other treatments were conducted at the following waterbodies:
 - Contoocook Lake, Rindge
 - Lake Monomonac, Rindge
 - Captains Pond, Salem
 - Crescent Lake, Wolfeboro
 - Lake Wentworth, Wolfeboro
- Numerous presentations were given to lake associations about exotic plants

2000

- New Variable milfoil infestations documented in Little Squam Lake and Squam River, Holderness/Ashland, Danforth Pond, Ossipee, and Rocky Pond, Gilmanton.
- Re-investigations of the two suspect infestations of milfoil from summer of 1999 confirmed that the species of milfoil in Belleau Lake, Wakefield, and Horseshoe Pond, Merrimack were indeed the variable milfoil.
- Herbicide applications conducted at the following locations in 2000:

- Lake Winnepesaukee, Meredith, Gilford, Center Harbor, Moultonboro, and Alton
 - Northwood Lake, Northwood
 - Locke Lake, Barnstead
 - Lake Monomonac, Rindge
 - Contoocook Lake, Rindge
- Innovative milfoil management activities taking place on Lake Massasecum, Bradford. Lake Association, through funding from NHDES, have constructed harvester to repeatedly harvest milfoil in northern cove of lake.
- RUA installed in Little Squam Lake to contain milfoil.
- Hand-pulling conducted on milfoil in channel connecting Big and Little Squam Lakes.
- Research on milfoil impacts to property values initiated at UNH.
- RSA 487:16-b went into effect making it unlawful to knowingly, recklessly, or purposely offer for sale, distribute, sell, import, purchase, propagate, or introduce exotic aquatic weeds into New Hampshire waterbodies. The new law makes it a violation to conduct any of the above listed activities.

2001

- New Variable milfoil infestations documented in Lake Sunapee, Sunapee at Georges Mill, and Dublin Lake in Dublin.
- A new invasive plant was first documented in New Hampshire. *Egeria densa*, also known as Brazilian elodea, was found in Nutts Pond in Manchester.
- Herbicide applications conducted in 20 waterbodies, the most waterbodies ever treated in one summer in New Hampshire.
- Innovative milfoil management activities taking place on Lake Massasecum, Bradford. Lake Association, through funding from NHDES, have continued harvesting activities and installing bottom barriers.
- RUA installed in Little Squam Lake and Lake Sunapee to contain milfoil.
- Hand-pulling conducted on milfoil in channel connecting Big and Little Squam Lakes, Dublin Lake, and Lake Sunapee.
- Research on milfoil impacts to property values by UNH suggests a 16+% decline in lakefront property values.

2002

- New Variable milfoil infestations documented in Turtletown Pond in Concord, Balch Lake in Wakefield (plants found in 2001, but not in flower), Melendy Pond and Lake Potanipo in Brookline and in Brindle Pond in Barnstead.
- DES conducted 25 herbicide applications on various waterbodies throughout the state. This is the most number of treatments that have been conducted in any one year since the program began.
- Innovative harvesting activities continued on Lake Massasecum in Bradford.
- New Hampshire Lakes Associated established a pilot Lake Host Program on several waterbodies.

- NHDES began working with Dartmouth College to sequence milfoil genetics and determine if hybridization is occurring.

2003

- RSA 487:25 goes into effect establishing the Milfoil and Other Exotic Aquatic Plant Prevention and Research Grant Program.
- First round of Milfoil and Other Exotic Aquatic Plant Prevention Grants awarded to three recipients. New Hampshire Lakes Association, Department of Safety, and Androscoggin River Watershed Council.
- Two new infestations of Variable milfoil documented in Jones Pond in New Durham and in Scobie Pond/Haunted Lake in Franconia.
- Eurasian milfoil found growing again in Mountain Pond in Brookfield. It was assumed that this infestation was eradicated due to a 3-year drawdown of the pond. Five foot tall plants were found growing in August.

2004

- Four new infestations were documented this year. Variable milfoil was found in the Merrimack River at the confluence with the Contoocook River in Penacook; in Kimball Pond in Hopkinton, and in the Pemigewasset River in Sanbornton. Fanwort was found in Otteric Pond in Hudson.
- Three Prevention Grants were given out this year. The New Hampshire Lakes Association, Ossipee Lake Alliance, and the Department of Safety, Division of Safety Services received grants.
- One Research Grant was given in 2004. Suncook Lake Association, in participation with the University of New Hampshire, was given a grant to evaluate the effectiveness of a detailed 2,4-D treatment, and to determine if 2,4-D migrates through the substrate and into nearshore wells under normal, and rigorous, pumping regimes.

2005

- One new infestation was found in 2005. Fanwort was found growing in Wilson Lake in North Salem. This infestation was most likely caused by the downstream migration of fragments out of Arlington Mill Reservoir.
- Three Prevention Grants were awarded in 2005. The New Hampshire Lakes Association, the Department of Safety, Division of Safety Services, and the Connecticut River Conservation District Coalition received funds for various projects.
- One Research Grant was awarded during this year. The Suncook Lake Association received a grant to optimize the function of a SCUBA diving device which will aid in efficient milfoil mapping.
- The DES worked closely with a Milfoil Study Committee that was established in 2004. The group met several times throughout the year, and DES was present to

provide updates of the program, status of exotics, and to provide input on future directions that the legislative committee could assist with.

Appendix Three

Education and Outreach Materials

ENVIRONMENTAL Fact Sheet



6 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.state.nh.us

WD-BB-40

Revised 1999

Law Prohibits Aquatic Plants

As of January 1, 1998, the sale, distribution, importation, propagation, transportation, and introduction of exotic aquatic plants into the state of New Hampshire is prohibited (RSA 487:16-a). This new law was designed as a tool for lake managers to help prevent the spread of nuisance aquatic plants. It is hoped that by preventing their transport over land, their spread between lakes will be stopped.

The following is a list of prohibited exotic aquatic species in New Hampshire:

Scientific Name	Common Name
<i>Myriophyllum heterophyllum</i>	variable milfoil
<i>Myriophyllum spicatum</i>	Eurasian milfoil
<i>Cabomba caroliniana</i>	fanwort
<i>Hydrilla verticillata</i>	hydrilla
<i>Trapa natans</i>	water chestnut
<i>Myriophyllum aquaticum</i>	parrot feather
<i>Potamogeton crispus</i>	curly leaf pondweed
<i>Lythrum salicaria</i> , <i>L. virgatum</i> , <i>L. alatum</i>	purple loosestrife
<i>Phragmites australis</i> or <i>P. communis</i>	common reed
<i>Egeria densa</i>	Brazilian elodea
<i>Hydrocharis morsus-ranae</i>	frogbit
<i>Butomus umbellatus</i>	flowering rush
<i>Najas minor</i>	European naiad
<i>Nymphoides peltata</i>	yellow floating heart

There are currently 41 waterbodies in the state with known exotic plant infestations. Milfoil and fanwort have been spreading between New Hampshire's waterbodies since the late 1960's. It is believed that these plants first entered the state's waterbodies from a discarded home aquarium. From there, these nuisance plants have spread to other lakes in the state primarily through boating activities. Water chestnut (*Trapa natans*) was recently discovered in the Nashua River. The other plants listed above have become nuisance species in other states, and may find New Hampshire's waters adequate for infestation.

How did this law come about?

Since the mid 1960's, various lakes around the state have been plagued by nuisance aquatic plants such as exotic milfoil and fanwort. Others that do not grow directly in water, but in moist habitats such as roadsides ditches and wetlands, have been spreading rapidly. The pretty purple flower known as purple loosestrife and the tall tufted reed known as common reed are becoming common sights in the state.

To prevent the further spread of these nuisance exotic plants, the NH Department of Environmental Services (DES) has drafted rules to make RSA 487:16-a enforceable. These rules include the above listed prohibited species which are already, or may quickly become, nuisance aquatic plants in New Hampshire.

Why are these particular plants a problem?

Plants which are native to a particular area have attracted a variety of predators including insects, animals, or pathogens (viruses/fungi) which prevent out-of-control plant growth. Exotic plants have been introduced into the state from areas that are both inside and outside of the United States. Because they are not native to the state, they have no natural predators to moderate their growth. Exotic species are thus able to flourish unchecked in any suitable habitat.

Once established in the state, exotic plants can take over large portions of the ecosystems to which they are introduced. They can cause a decrease in the aesthetic, recreational, and monetary value of New Hampshire's waterbodies. Exotic species can also pose a threat to many native species and valuable wildlife habitats.

How did these plants find their way to New Hampshire?

There are a variety of sources that are believed to have introduced exotic plant species into the state. Some of these sources are natural and are hard to control. A natural source may include the widening of the species range due to an increase in disturbed areas. Interstate transport of exotic plants may also occur when seeds and plant pieces become attached to migrating birds and waterfowl.

Other sources revolve around human activities. The sale of aquatic plants, dumping of aquaria into waterbodies, importation of plants for distribution or research, boats, vehicles, and trailers traveling between infested and uninfested waterbodies, and even fishing lures and bait buckets with plant pieces attached can all result in the statewide spread of the nuisance exotic plants. These activities though numerous, are more easily regulated than natural means of transport.

What can be done to prevent the spread of exotic aquatic plants?

Since the law went into effect, activities involving the 14 listed exotic plants can be effectively managed. To prevent the further spread of these species, always check your boats, motors, trailers, vehicles, fishing lures, bait buckets, and any other equipment that may have come into contact with any exotic plant or its habitat. Before you launch your boat and after you pull it out of the water, make sure that you don't have any tag-along plants. Remove all plants that are attached to your boat. Dispose of all plants away from the waterbody. Many launch sites have trash cans where you can dispose of these plants. **DON'T THROW THEM BACK IN THE WATER!**

If you are in any profession or have a hobby that puts you in contact with any exotic aquatic plants listed in the rules associated with RSA 487:16-a, please be aware of the new law. If you are a distributor or enthusiast of water garden plants, please collect and destroy all exotic aquatic species. There are many native aquatic plants that are suitable for sale and distribution within the state.

How does one effectively destroy exotic aquatic plants?

The best way to eliminate the threat which these plants pose is to insure that they are not able to be transported to an area where they are likely to reproduce themselves. Landfilling and burning (a permit may be required) are both appropriate means of disposal.

For those plants that are exclusively submerged, such as milfoil fanwort, or pondweed, alternative methods such as composting may be considered. However, the end product of composting should not be applied along shorelines of lakes and ponds, or along the banks of rivers and streams.

If you have any questions or concerns, or would like a copy of the law or the rules, please contact the DES Biology Bureau at (603) 271-3503.

ENVIRONMENTAL Fact Sheet



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WD-BB-4

1999

Weed Watchers An Association to Halt the Spread of Exotic Aquatic Plants

Milfoil (*Myriophyllum heterophyllum*, *Myriophyllum spicatum*) and fanwort (*Cabomba caroliniana*) are exotic aquatic plants that have become economic and recreational nuisances in some of New Hampshire's lakes and ponds. Dense stands of these plants inhabit shoreline areas frequented by water based recreationalists. Exotic plants can create the following problems:

- Displacement of beneficial wildlife.
- Reduction of aesthetic quality of lakes.
- Devaluation of waterfront property.
- Littering of beaches with plant fragments.
- Makes swimming difficult and dangerous.
- Snags fish lines and stunts fish life.
- Becomes tangled in outboard motor propellers.
- Chokes boat traffic lanes.
- Requires substantial funds for managing.

The spread of these plants to other uninfected waterbodies by transient boat traffic has increased over the last few years. If accidentally introduced into a lake, they grow at explosive rates. Many times new infestations are not discovered by state biologists until the weeds become a nuisance requiring expensive control methods. Once fully established, they are virtually impossible to eradicate. Therefore, education, vigilance, and early detection are key components in keeping these non-native nuisance weeds in check.

"Weed Watchers," a volunteer association dedicated to monitoring the lakes and ponds for the presence of exotic weeds, was formed by the NH Department of Environmental Services in 1988. Volunteers are given a special "Weed Watchers Kit" which contains the following:

- Photographs of exotic plants.
- Detailed drawings of the plants.
- An information bulletin on exotics.
- A list of lakes known to have exotic plants, including a map.
- Recommendations on how to conduct a plant survey.
- A complete set of fact sheets and pamphlets on exotics in NH.

The Weed Watchers Kit can be sent to you at no expense. Any individual wishing to participate in the "Weed Watchers" program should contact the Exotic Species Coordinator at:

Department of Environmental Services
Biology Bureau
6 Hazen Drive
PO Box 95
Concord, New Hampshire 03302-0095
(603) 271-3503

What does a Weed Watcher provide?

All that weed watching involves is a small amount of time during the summer months. Volunteers survey their waterbody once a month from June through August. To survey, volunteers slowly boat around the perimeter of that waterbody and any islands it may contain. Using the materials provided in the Weed Watchers Kit, volunteers will then look for any species that are of suspicion and send them to DES. After a trip or two around the waterbody, volunteers will have a good knowledge of its plant community and will immediately notice even the most subtle changes.

What happens if a Weed Watcher finds an exotic plant in a waterbody?

In most cases, volunteers will be instructed to send a plant specimen through the mail or deliver the specimen in person. Please try to collect a portion of the suspect plant when it is in flower. This may be the only way to precisely identify the plant. If the plant is an exotic, a biologist will visit the site to determine the extent of the problem and to formulate a plan of action to control the nuisance infestation.



ENVIRONMENTAL Fact Sheet

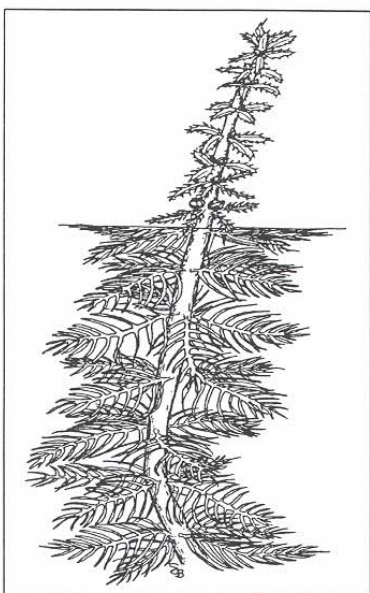


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WD-BB-23

Revised 2002

Variable milfoil *Myriophyllum heterophyllum* (Michx)



Species Description/General Information

Milfoil is a submerged aquatic plant with fine densely packed, feather-like leaves whorled around a main stem. It can grow up to 15 feet and may exhibit a three- to six-inch green spike-like flower above the waterline in July. A cross-section of the stem will reveal “pie-shaped” air chambers.

This exotic species of milfoil has been in the state since the late 1960s, and can currently be found in over 50 waterbodies in New Hampshire. There are six native milfoil species present in the state that do not cause problems. Eurasian milfoil is another non-native milfoil found in New Hampshire, but it is less of a threat than variable milfoil due to our water chemistry.

Why is Milfoil Considered a Nuisance Species?

This species is not native to our state and is very difficult to control once it becomes fully established. Milfoil reproduces through fragmentation whereby plant fragments break off from the parent plant through wind or boat action, grow roots, and settle in a new location. Milfoil spreads rapidly and displaces beneficial native plant life. It makes swimming difficult and can devalue waterfront property. Where this species grows in its native environment, insects and fish may feed on this plant at such a rate as to control its growth. In New Hampshire, milfoil has no natural predators to keep its population in check. Under optimum temperature, light and nutrient conditions, milfoil may grow up to an inch per day.

How Did Exotic Milfoil Become Established in This State?

It was most likely a “stowaway” fragment attached to a boat or trailer that came to this region. Milfoil can live out of water for many hours if it remains moist, like when it’s wound around a wet carpeted bunk on a boat trailer. Milfoil is usually first found near boat launch sites.

Another theory is that milfoil was introduced to a New Hampshire waterbody through the dumping of a home aquarium. This plant is sometimes used as an ornamental plant in fish aquariums.

Once Established, How Does Milfoil Infest Other Areas of a Waterbody?

Boat propellers will chop milfoil plants into small fragments. These fragments float on the surface and are at the mercy of the wind and lake currents. In a short time, roots form on these fragments. If washed ashore, these plants eventually take hold creating a new colony of milfoil. The cycle goes on until every suitable area is filled in with these weeds. An alternative form of the plants develops during low water. This vegetation type is more succulent than the submersed form.

What Methods Are Currently Being Used to Control Milfoil?

Three methods are currently used to control variable milfoil. Hand-pulling of new infestations is one way to prevent a full-lake infestation, but these patches must be detected early. When the plants become too large to hand-pull, a benthic barrier may be placed on the lake bed by State divers to compress the plants to the bottom and block sunlight. This works only in very small patches. The other method for controlling plants when they become too large to pull or cover is the use of an aquatic herbicide. These herbicides can provide one to three years of control in a waterbody.

There is no way to eradicate the plant once it has become well established in a waterbody. DES is currently working with Dartmouth College to determine the genetics of the milfoil plants and to see if there is a possibility for future genetic control of the plant.

Have Chemicals Been Used to Effectively Control Exotic Milfoil?

One chemical treatment in the spring, during peak plant growth, is sufficient for milfoil control for the remainder of the treatment season, and perhaps into the next. Chemicals are usually the method of choice for small new infestations that are too large for hand-pulling or screening. However, attempts to eradicate extensive areas of weeds using chemicals are rarely effective. In most cases, the treated area becomes re-infested with fragments from other sections of the lake.

It is illegal to apply chemical herbicides to any New Hampshire waters unless you contract with a licensed applicator. The use of chemicals by an untrained person could jeopardize the health and welfare of the lake and its ecology. Inappropriate or inaccurate use of chemicals is life-threatening to people. It should be noted, however, that the state has been conducting herbicide applications for several years, and no negative impacts to non-target plants, animals, or humans have been observed.

For more information on milfoil or other Exotic Species, please contact the Exotic Species Coordinator at 603-271-2248 or asmagula@des.state.nh.us. Also, visit the Exotic Species website at www.des.state.nh.us/wmb/exoticspecies/.

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WD-BB-24

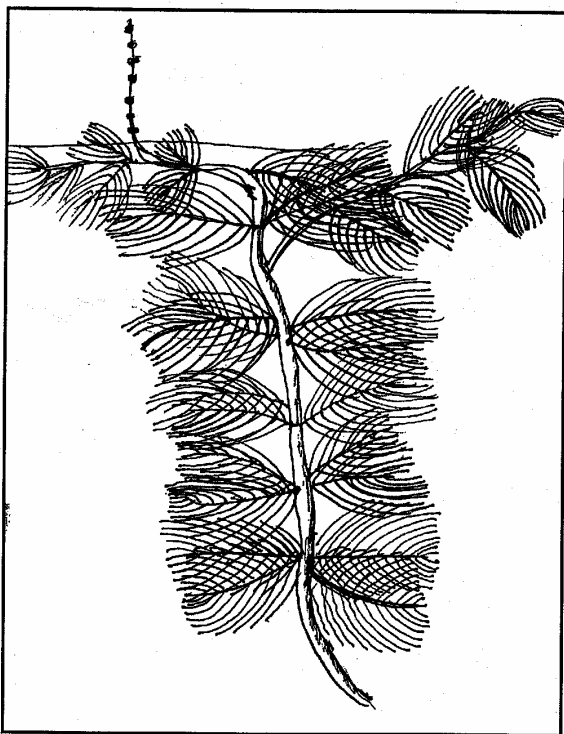
Revised 1997

WANTED!!

Information on the location of this exotic plant.

Eurasian Milfoil

(*Myriophyllum spicatum*)



Remove all plants from your boat and trailer before launching and when you leave.

Description

....submerged aquatic plant with whorled feather-like leaves that appear to have been clipped on the end. Eurasian milfoil can grow up to 10 feet and exhibits a reddish shoot near the surface. It forms dense mats of tangled plants in lakes and ponds.

General Information

Eurasian milfoil, which originally came to this country from Europe and Asia is a serious nuisance to many lake residents. **Once introduced to a lake (usually by boats) it grows and spreads very quickly, ultimately ruining valuable shorefront property.** Mountain Pond in Brookfield is the only New Hampshire waterbody sustaining this nuisance plant to date. However, this species can be found in nearby Vermont and Massachusetts.

Please inform DES if you see this plant.
603-271-3503

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WD-BB-44

1999

Aquatic Plants and Their Role in Lake Ecology

Aquatic plants are a common sight in New Hampshire waterbodies, and many lake residents, as well as visitors to New Hampshire's numerous waterbodies, may question the importance and role of aquatic vegetation. One may ask whether these plants are beneficial or detrimental to the health of a lake ecosystem. This fact sheet will seek to address the most commonly asked questions and concerns regarding aquatic vegetation and their role in lake ecology.

What Types of Aquatic Plants Live In My Lake?

The most common types of aquatic vegetation are those which grow on the shoreland, those which grow partially within a waterbody (emergent), those which grow completely in a waterbody (submerged), and those which float on the surface of a waterbody. Even smaller plants called phytoplankton, commonly known as algae, are also present in our waterbodies. In most cases all of these vegetative types are present in a waterbody, creating a diverse aquatic habitat for a wide range of organisms. All types of aquatic vegetation are beneficial to a lake ecosystem provided they are native to New Hampshire waters.

What Are the Benefits of Aquatic Plants?

Aquatic plants provide many of the same functions as terrestrial plants. Aquatic plants provide a food source, habitat, removal of carbon dioxide, and production of oxygen through photosynthesis. Plants act as the producers in the ecosystem since they produce their own food as well as food for the consumers or animals of that ecosystem. Aquatic vegetation provides food for tiny microscopic animals called zooplankton, fish, waterfowl, moose and other mammals, and in some cases humans.

Aquatic vegetation also acts as a habitat. Submerged vegetation provides a habitat for small fish which may seek refuge from predators. They may also use this vegetation as spawning beds to lay their eggs. Emergent vegetation provides a habitat for certain songbirds, or wading birds who may nest at these sites or use them as feeding areas.

Not all aquatic plants are nuisances which require removal. Native plants provide many benefits to the lake including spawning and habitat areas for organisms in the lake, as well as fishing and wildlife viewing areas for the residents around the lake.

The wildlife that resides on a lake, as a result of healthy habitats, adds to its serenity. Melodies sung by songbirds, the cry of the common loon, the chirping of frogs, dazzling dragonflies, the painted turtle sunning itself on a rock, and even the majestic herons would be threatened if it weren't for the food and habitat which aquatic vegetation provide.

Aquatic plants also provide several items which humans use. Some of these include rice, cranberries, blueberries, fibers for rope, reeds for caning, herbs, medicinal compounds, and aesthetic items such as flowers and colorful fruits and berries for decoration.

What Happens If There Are Too Many Plants?

As lakes age, plant abundance will naturally increase. However, increased human impacts can cause the aging to occur prematurely. Too much aquatic vegetation within a waterbody may become problematic. Those plants which are not consumed by zooplankton, fish, or waterfowl are consumed in large rates by decomposing bacteria. Excess decomposition by bacteria may deplete oxygen reserves in a waterbody. An increase in decomposition of plant material (in the lower layers of a lake) can cause the build up of 'muck' at the bottom of a waterbody. This filling in, or "aging" of a waterbody can cause the depth to decrease and temperature to increase. A rise in temperature can cause more evaporation and even a lower amount of available oxygen for certain fish species. The addition of sand and sediment may also unnaturally fill a waterbody creating shallow areas for plants (perhaps exotic) to establish.

What Can Be Done To Limit Nuisance Amounts of Plant Growth?

As a lake resident or concerned citizen, be aware of the activities that take place within the watershed. Nonpoint source pollution is the most common means of nutrient transport into a waterbody. Runoff from roads, septic systems, lawns, and agriculture may bring with it much nitrogen and phosphorus. In freshwater, phosphorus is a nutrient that limits plant growth. The lower the phosphorus levels, the fewer the plants. The best way to protect a waterbody is by protecting its shoreland by maintaining a healthy, well-distributed stand of trees, saplings, shrubs, and groundcover, which act as a filter for nutrients and sediments. Other factsheets are available from DES by contacting the Biology Bureau at (603)271-3503.

Aquatic Plants Are a Natural and Beneficial Part of Your Lake

Aquatic plants are found in most lakes and ponds in New Hampshire. They are a natural component and vital link to a healthy and diverse aquatic ecosystem. When aquatic plants interfere with human activities, the plants may be quickly viewed as "weeds," or nuisances that must be removed. However, complete removal of native aquatic plants is not recommended. Not only is it costly and impractical, and may need a permit, it is detrimental to a healthy lake ecosystem. In addition, if the lake is cleared of its native aquatic vegetation, exotic aquatic vegetation may start to colonize the lake. This occurrence has been proven in a number of New Hampshire waterbodies where disturbances to native plant communities have taken place. Maintaining a balanced population of native plant life in a waterbody is the ultimate goal.

ENVIRONMENTAL Fact Sheet



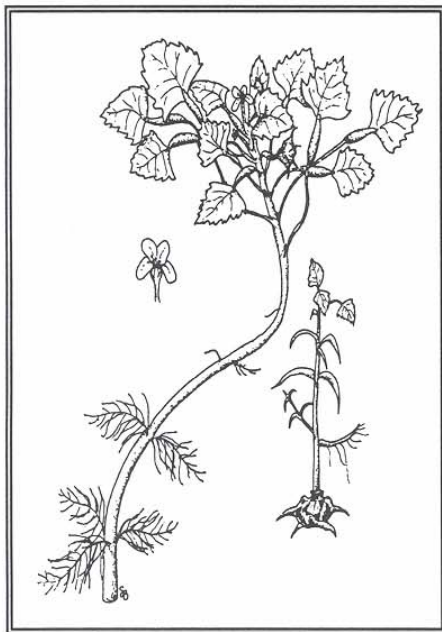
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WD-BB-43

1999

Water Chestnut Discovered in New Hampshire Waters

Water Chestnut (*Trapa natans*)



In July 1998, the NH Department of Environmental Services (DES) confirmed reports that the exotic aquatic plant water chestnut has infested the Nashua River in Nashua. Water chestnut can completely cover the surface of a waterbody and cause ecological hardship to native plants and animals. Fishing and boating can become extremely difficult as well.

This plant is not the same species as the edible water chestnut used in Asian cooking. Water chestnut is a member of the Trapaceae family and derives its name from the single-seeded horned fruits, the "chestnuts." Each of the four horns on the nut is sharp and has a spine with several barbs. Each plant has two types of leaves: submerged leaves that are feather-like and oppositely paired along the stem, and waxy floating leaves that are triangular and form a rosette on the water's surface. The petiole (leaf stalk) of the floating leaves has a bladder-like swelling filled with air and spongy tissue which provides buoyancy. Cord-like plant stems can attain lengths of up to 16 feet.

The water chestnut is an annual plant which exhibits great reproductive capacity. The seeds germinate in early spring. An individual seed can give rise to 10-15 rosettes, each of which can produce 15-20 seeds. Thus, one seed can produce 300 new seeds in a single year.

Water chestnuts begin to flower in mid to late July, with their nuts ripening approximately one month later. Flowering and seed production continue into the fall when frost kills the floating rosettes. The mature nuts sink to the bottom when dropped and may be able to produce new plants for up to 12 years. The plant spreads either by the rosettes detaching from their stems and floating to another area, or more often by the nuts being swept by currents or waves to other parts of the lake or river. The plant overwinters entirely by seed.

Water chestnut is a nuisance aquatic plant that limits boating and fishing in infested areas. It has the potential to infest wetlands and critical environmental habitats in other areas of the state.

ENVIRONMENTAL Fact Sheet



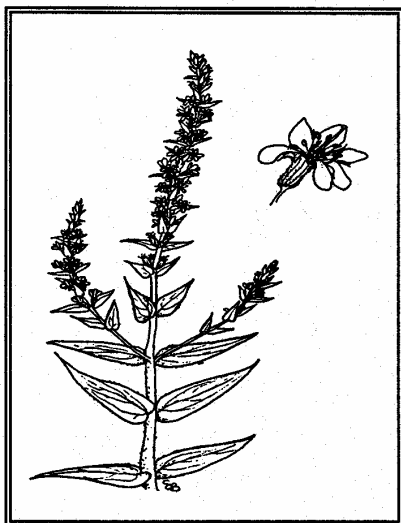
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WD-BB-45

1999

Purple Loosestrife: An Exotic Menace

Purple Loosestrife
(*Lythrum salicaria*)



Species Description

Purple loosestrife is an erect perennial herb standing 3-10 feet tall. Its average height is 5 feet. The plant blossoms from late June through late August with purple flowers that are located in long spikes at the ends of its branches. Its leaves are downy with smooth edges in whorls of three. One purple loosestrife plant may grow as an individual stalk or as several stalks clumped together. This plant has a woody tap root and a fibrous root system. Its stems have four angles and are woody at the base. As beautiful as this plant may appear, its beauty is deceptive, as purple loosestrife is gradually altering our nation's wetlands. Look-alikes of this plant are swamp loosestrife and blue vervain.

Species Range and Distribution

Purple loosestrife is not only a problem in New Hampshire but throughout North America and Canada as well. The northeastern United States and southeastern Canada are the areas experiencing the greatest impact of purple loosestrife. The distribution of purple loosestrife ranges from being common to abundant, and many areas have been found to support dense stands of this plant.

How Was Purple Loosestrife Introduced?

Purple loosestrife is native to Eurasia. It was originally introduced to eastern North America in the early to mid 1800's. This invasive plant was either accidentally introduced via ship ballasts, deliberately brought over as an ornamental plant, or its seeds may have been transported by imported raw wool and sheep.

Where Does Purple Loosestrife Invade?

Optimum habitats for purple loosestrife include freshwater marshes, open stream margins and alluvial floodplains. Purple loosestrife also invades wet meadows, pasture wetlands, cattail marshes, stream and river banks; lake shores, irrigation ditches, drainage ditches, and storm water retention basins. Purple loosestrife is often associated with cattail, reed canary grass and other moist soil plants.

What Makes Purple Loosestrife A Good Invader?

Purple loosestrife prefers moist organic soils, fluctuating water levels, and full sunlight. However, this plant can survive in many conditions associated with disturbed sites, such as construction sites for docks and marinas. It can tolerate a wide range of environmental conditions (temperature, sunlight, pH, nutrient levels) and can establish itself on a variety of substrates (gravel, sand, clay, and organic soil). Purple loosestrife has no natural predators (such as disease or insects) on this continent, therefore, it has an incredible ability to out-compete native vegetation and to form dense stands.

How Does Purple Loosestrife Spread?

Purple loosestrife's ability to spread contributes to its success as an invader. One adult purple loosestrife plant can produce 2.5-2.7 million seeds annually. Seeds from the plant are viable for many years. They may remain dormant in the soil until conditions are right for germination. These seeds are easily dispersed and transported by water, wind, bird feathers, animal fur, footwear, boats, boat trailers, and car tires. Purple loosestrife is also capable of re-sprouting from broken stems, underground roots, and plant fragments. If hand-pulled and any nodes are left in the roots, the plant will re-sprout. If mowed, the cut stem pieces will send out new roots and form new plants. The once commercial sale of purple loosestrife also increased the spread of this plant by introducing it to various wetlands and home gardens. It is now illegal to sell, purchase, propagate, import, distribute, and transport *Lythrum* species in New Hampshire.

Why Is Purple Loosestrife a Problem?

Purple loosestrife negatively affects both wildlife and agriculture. It displaces and replaces native flora and fauna, eliminating food, nesting, and shelter for wildlife. Purple loosestrife forms a single-species stand that no bird, mammal, or fish depends upon, and germinates faster than many native wetland species. If wildlife species are displaced, those that cannot move into new areas may be lost. By reducing habitat size, purple loosestrife has a negative impact on fish spawning and waterfowl habitat. The plant also diminishes wetland recreational capability such as boating, fishing, and hunting. This, in turn, may hurt local economies. Purple loosestrife affects agriculture by blocking flow in drainage and irrigation ditches and decreasing crop yield and quality.

What Are Some Solutions To The Purple Loosestrife Problem?

Three possible control methods exist for controlling the spread of purple loosestrife. These include physical, biological, and chemical means. None of these methods will completely eliminate purple loosestrife, but they will control the populations within ecologically acceptable limits.

Physical Control of purple loosestrife is possible for stands of smaller plants (less than 100 plants). It involves physically removing the plants from the soil at the root. Removal should ensure that all root and plant pieces are dug out of the soil. The best time to remove purple loosestrife from the soil is prior to seeding time just before the plant blooms. Removal after this time will not eliminate the seeds which have

already been produced by the plant. Once the plants are removed they should be burned or tightly bagged to prevent the spread of seeds or re-sprouting. Composting is not an alternative as the plants may regenerate in the compost pile. Many local conservation commissions, garden clubs, and other specialty groups throughout New Hampshire are initiating their own purple loosestrife monitoring programs involving mapping, hand-pulling, and disposal of this nuisance plant.

Biological Control is a method of control involving the release of predators to attack the pest species. Three different species have been used in North America to attempt to control purple loosestrife: two species of beetles, and one weevil. These three species are common in Europe where they combine to act on the leaves and roots, thereby controlling its populations. Several years of field trials will be necessary to determine whether biological control methods have real potential to effectively control purple loosestrife.

The New Hampshire Department of Agriculture (NHDA) and the New Hampshire Department of Transportation (NHDOT) are working on a joint project to introduce beetles into areas infested with purple loosestrife. The beetles feed on the plants, curbing their growth within a five year period, depending on the size of the infestation.

Chemical Control has not received FDA approval and the use of chemicals to combat purple loosestrife is many years away. In addition, special permits are required, and only licensed applicators may apply chemicals in or near a waterbody in New Hampshire.

What Can I Do To Help?

As a concerned resident of New Hampshire, there are many things you can do to help prevent the spread of purple loosestrife. The first step is to **recognize it**. Purple loosestrife is most easily identified when in bloom, before it goes to seed. The second step is to **report it**. If a large infestation is identified, you can contact NHDA, NHDOT, or NHDES. Mapping the infestation is helpful as well. The third step is to **remove it**. Check with authorities prior to removal, and always consult the landowner for permission. Your assistance is valuable in helping New Hampshire to combat the spread of this exotic menace.

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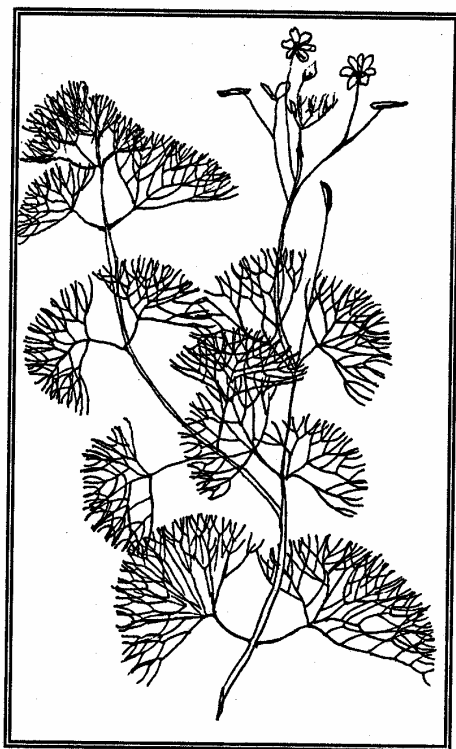
WD-BB-25

1999

WANTED!

Information on the location of this exotic plant

Fanwort (*Cabomba caroliniana*)



**Please contact DES if you
have seen this plant.**

Species Description

Fanwort is a submerged bright green aquatic plant with narrow leaves arranged in a fan shape manner oppositely located on a long a narrow stem. Floating, lily-like leaves are found on the water's surface during flower production. Flowers are small, white, and emergent. This stem plant stands approximately 20 inches tall, with its slender stem coated in a gelatinous slime. Leaf segments are approximately 1mm wide. Fanwort flowers from July through September.

General Information

Fanwort is a native plant of the southern United States, and Latin and South America. It is currently found in Arlington Mill Reservoir in North Salem, Island Pond in Derry, Phillips Pond in Sandown, Mine Falls Pond in Nashua, and the Nashua River in Nashua. This exotic plant was discovered in New Hampshire in the late 1960s and entered the state via the back of a transient boat trailer or was dumped from a tropical fish aquarium. Characteristic of many exotic plants introduced to a new environment, Fanwort quickly invades shoreline areas of waterbodies, ultimately impairing recreational activities.

BEFORE YOU BOAT... KNOW WHAT YOU TOTE!

*It's up to YOU to control
aquatic nuisance species*



Zebra Mussels



Variable Milfoil



NOTICE TO BOATERS

Exotic plants and zebra mussels pose a significant risk to the health of New Hampshire's waterbodies. These aquatic nuisance species are transported via boats, trailers, fishing equipment, bait fish and bait buckets, diving gear and other aquatic recreational equipment. It's important to prevent zebra mussels, milfoil, and other aquatic nuisance species from being introduced to New Hampshire's waterbodies. Once established, it's impossible to eradicate these organisms, and management is very expensive. In addition, these exotic aquatic nuisance species each cause significant harm to native species of fish, plants and insects and their natural habitats.

HOW CAN YOU HELP?

LOOK for signs near boat launch sites. These signs warn of any aquatic nuisance species in a waterbody.

REMOVE all materials (plant or animal) from any equipment that has been in contact with an infested waterbody. Dispose of plant or animal material away from the waterbody.

Don't throw it back in the water.



Zebra Mussel

WASH AND DRY all equipment before using it again. Simply hosing off the boat, diving gear, or trailer may be enough. In some cases, a high-pressure and high-temperature (>140 d. F.) wash or light scraping may be necessary.

DRAIN AND FLUSH the engine cooling system and live wells of your boat, the buoyancy control device from diving equipment, and bait buckets of all plants and organisms.

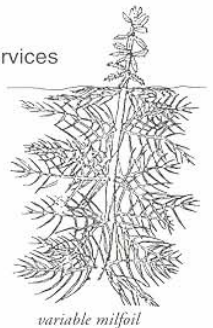
INSPECT your equipment before you launch into, fish, dive, or paddle on another waterbody.

REMEMBER, as of January 1, 1998, it is illegal to transport exotic aquatic plants in New Hampshire.

For more information, contact:

N.H. Department of Environmental Services
(Exotic Weed Program)
6 Hazen Drive
Concord, NH 03301
(603) 271-2963
www.des.state.nh.us

N.H. Fish and Game Department
2 Hazen Drive
Concord NH 03301
(603) 271-2501
www.wildlife.state.nh.us



variable milfoil

PUB99001-vv

Appendix Four

Examples of Boat Launch Signs

[illegible]

Appendix Five

Prevention and Research Grant Scoring Matrices

Rating Criteria Matrix

Rank 0-5, with 5 being the superior rating.

Reviewer: _____

[illegible]

Grant Scoring Guidelines

- 1) Grants must be scored objectively with no bias given for state or personal knowledge of the project or applicant.
- 2) Review applications with whatever method works best for you. We recommend reading all the grants drafting a score for each as you go, then once all the grants have been reviewed, assign your final scores.
- 4) Applications will be judged based on the criteria listed and defined below. Reviewers will score the application from 0-5 for each criterion. Scores will be weighted (see scoring matrix). Adding the weighted scores for the 5 categories will give a Total Score for each application. Each application will be scored by the Grant Review Committee, with the average of the total scores making the Final Score.
- 5) We will fund as many grants as possible within our funding limit. There are no budget limits per application at this time. What is a possible alternative is to grant some applicants partial monies. This will also enable us to give out more grants.
- 6). In the case of tied scores, the Grant Review Committee will re-review the grants in question to break the tie.

Scoring Categories:

Project Approach: Through the project narrative as described above in Section VI, the applicant should clearly state the goals of the project and how the goals will be achieved.

Management Approach: The applicant must demonstrate the capability to effectively manage the project to successful completion and project funding through a capable project team.

Community Benefit/Partnership: Does the project have the support of local partners, including towns, municipalities, abutters, or lake and watershed residents? Letters of support should be attached to the application.

Creativity: Is the project creative or innovative in ways that are likely to result in advances or improvements that are transferable across the state?

Filling out the Scoring Matrix:

- Make sure you write your name at the top of the score sheet
- In the first column, be sure to list the applicant name and affiliation.
- For each category, record your score from 0-5; then in the shaded column record the weighted score (your score times the weight listed at the top of the column).
- The last column should be the sum of all the weighted scores from the shaded columns.

Rank 1-5, with 5 being the superior rating.

Reviewer:_____

[illegible]

Grant Scoring Guidelines

- 1) Grants must be scored objectively with no bias given for state or personal knowledge of the project or applicant.
- 2) Review applications with whatever method works best for you. We recommend reading all the grants and drafting a score for each as you go. Once all the grants have been reviewed, assign your final scores.
- 4) Applications will be judged based on 5 criteria, listed and defined below. Reviewers will score the application from 1-5 for each criterion. Scores will be weighted (see scoring matrix). Adding the weighted scores for the 5 categories will give a Total Score for each application. Each application will be scored by the Grant Review Committee, with the average of the total scores making the Final Score.
- 5) We will fund as many grants as possible within our funding limit. There are no budget limits per application at this time. What is a possible alternative is to grant some applicants partial monies. This will also enable us to give out more grants.
- 6). In the case of tied scores, the Grant Review Committee will re-review the grants in question to break the tie.

Scoring Categories:

Project Approach: Does the project have a clearly defined goal, with clear ideas of how the applicant plans to achieve that goal and what the end result should be? The applicant should show a clear understanding of the issue, and the project should aim to address this issue. This information will be conveyed in the Project Narrative. The more organized and structured the project narrative, the more points earned.

Management Approach: Can the applicant effectively manage the funds and tasks to achieve the proposed results? Projects should request a reasonable amount of money considering the project scope and goals, and build on other resources such as other grants or the support of other groups. Applicants should provide rationale for their budgets and how monies will be spent.

Community Benefit/Partnership: Does the project seek to provide benefits which would extend to the community as a whole (i.e., exotic plant management, eradication, etc). Does the project bring in partners with varied backgrounds and areas of expertise?

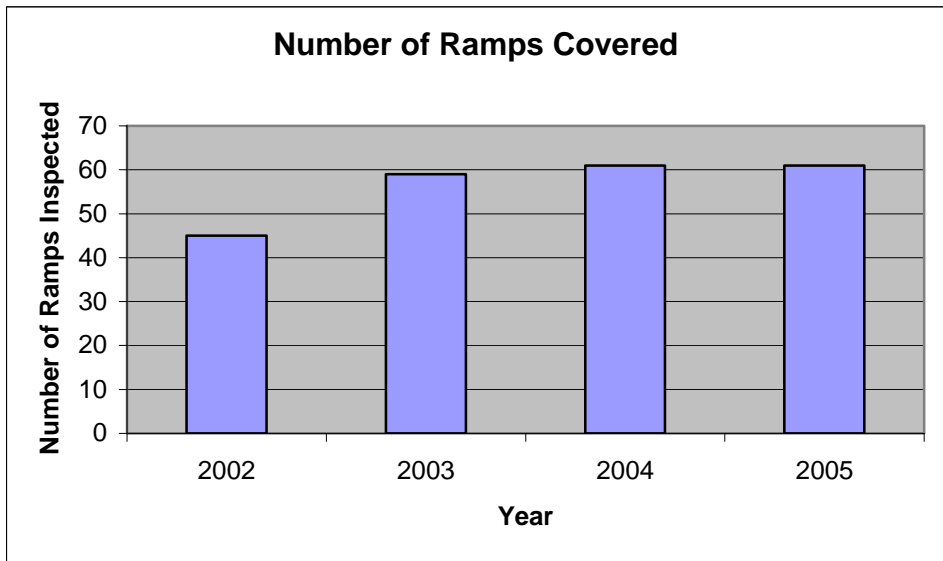
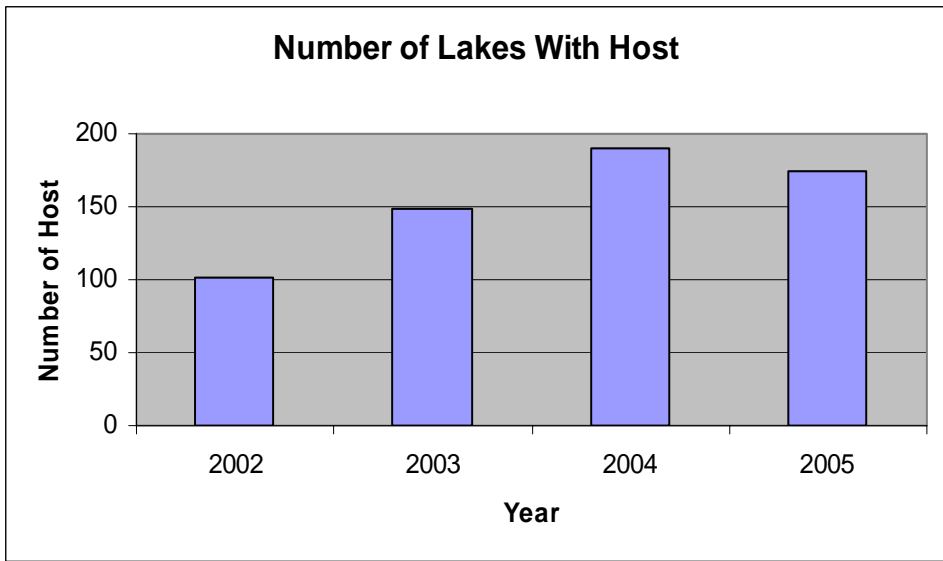
Originality and Effectiveness: Does the project exemplify a well thought out and new or unique approach? Is the project likely to result in advances in prevention or research goals? The more unique and effective the project, the more points awarded.

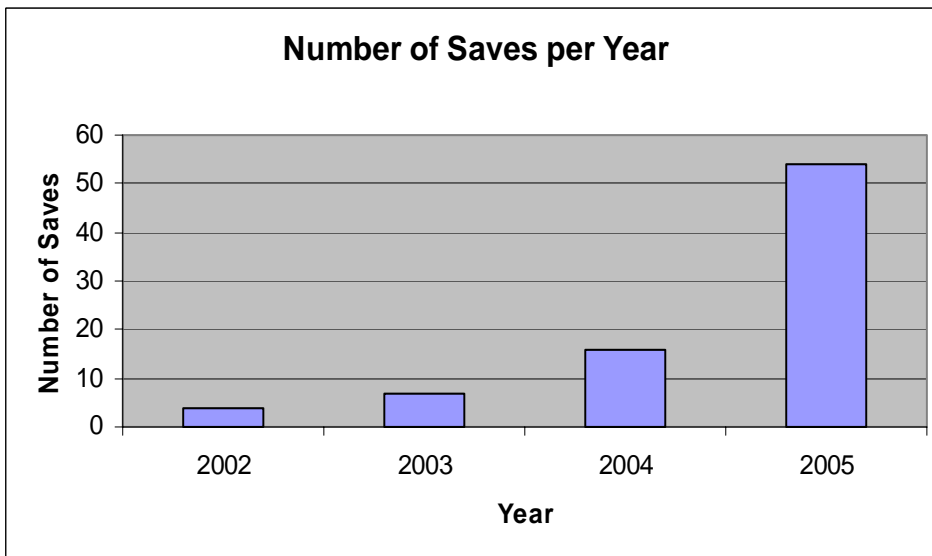
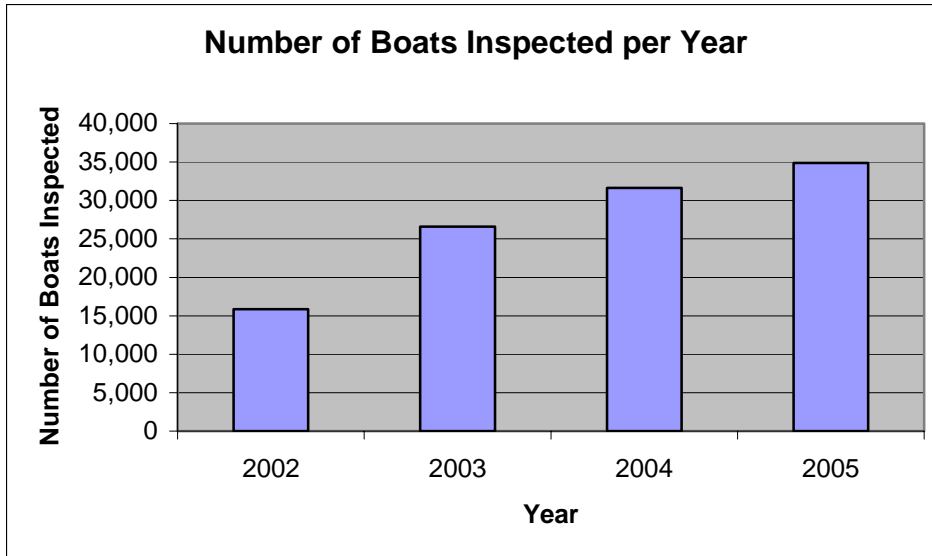
Filling out the Scoring Matrix:

- Make sure you write your name at the top of the score sheet
- In the first column, be sure to list the applicant name and affiliation.
- For each category, record your score from 1-5; then in the shaded column record the weighted score (your score times the weight listed at the top of the column).
- The last column should be the sum of all the weighted scores from the shaded columns.

Appendix Six

Lake Host Program Key Data





Appendix Seven

Criteria to Evaluate the Selection of Aquatic Plant Management Techniques

Criteria to Evaluate the Selection of

Exotic Aquatic Plant Control Techniques (Working Document)
NH Department of Environmental Services
Water Division

Preliminary Investigations

I. Field Site Inspection

- Verify that the plant is an exotic species.
- Map extent of the plant infestation (area, water depth, height of the plant, density of the population).
- Document any native plant abundances and community structure around and dispersed within the exotic/nuisance plant population.

II. Office/Laboratory Research of Waterbody Characteristics

- Contact Natural Heritage to determine the presence of rare or endangered species in the waterbody or its prime wetlands.
- Determine the basic relevant limnological characteristics of the waterbody (size, bathymetry, flushing rate, nutrient levels, trophic status, wetlands).
- Determine the potential impacts of exotics and/or of control practices to downstream waterbodies based on limnological characteristics (water chemistry, quantity, quality).

Determination of Control Practice Based on Preliminary Investigations

Following are a series of control techniques which have been used in New Hampshire in the past, as well as some techniques which are still experimental. The most appropriate technique based on the determinations of the preliminary investigation should be selected. These are the guidelines which were used to develop the criteria for the selection of a control technique.

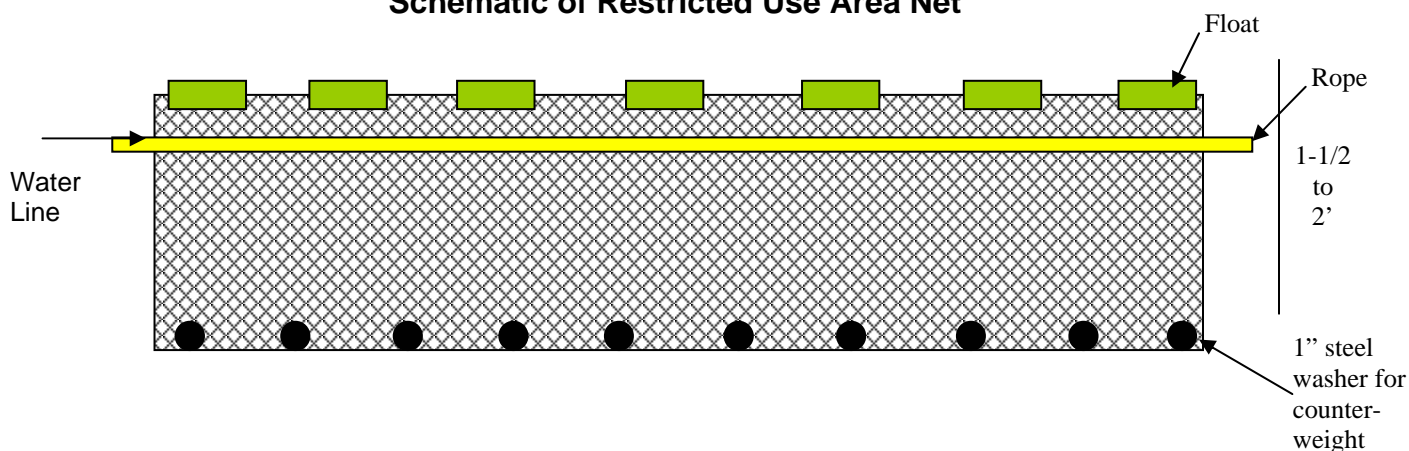
Guidelines and requirements of each control practice are detailed below each alternative.

Restricted Use Areas:

Restricted Use Areas (RUAs) are a regular control option for lakes with small, contained infestations of exotic plants, limited to small patches or embayments. This is often the case in waterbodies with newly-discovered infestations. RUAs restrict access to all recreational activities in a delineated area to minimize plant fragmentation and thereby reduce the spread of milfoil. As an additional method of protection from fragment migration, RUAs are encircled with a shallow net that is suspended vertically in the water column. The net is approximately 1.5-2.0 feet in height. The top of the net is set to extend four inches above the surface of the water, while the remainder is positioned below the surface of the water (see figure below). This configuration prevents the movement of

fragments from infested areas to uninfested areas. Due to the size and nature of net construction, there is no impediment to fish migratory patterns or spawning activities.

Schematic of Restricted Use Area Net



Hand-pulling:

When infestations of exotic aquatic plants begin as single scattered stems or small patches, DES biologists SCUBA dive to hand-pull the plants (and DES can train other certified divers to also perform this management practice).

The whole plant including the roots should be removed in this process, while leaving the beneficial native species intact. This technique works best in softer sediments, with shallow rooted species and for smaller, scattered infestation areas. When hand pulling nuisance species, the entire root system and all fragments of the plants must be collected since small root or stem fragments could result in additional growth of the species. The process must be repeated often to control re-growth of the exotic plants. For a new infestation, hand-pulling activities are typically conducted several times during the first season, with follow-up inspections for the next 2-5 years or until no re-growth is observed.

This control practice has proven successful in many waterbodies.

Mechanical Harvesting

The process of mechanical harvesting is conducted by using machines which cut and collect aquatic plants. These machines can cut the plants up to twelve feet below the water surface. The weeds are cut and then collected by the harvester or other separate conveyer-belt driven device where they are stored in the harvester or barge, and then transferred to an upland site.

The advantages of this type of weed control are that cutting and harvesting immediately opens an area such as boat lanes, and it removes the upper portion of the plants. Due to the size of the equipment, mechanical harvesting is limited to water areas

of sufficient size and depth. It is important to remember that mechanical harvesting can leave plant fragments in the water, which if not collected, may spread the plant to new areas. Additionally harvesters may impact fish and insect populations in the area by removing them in harvested material. Cutting plant stems too close to the bottom can result in re-suspension of bottom sediments and nutrients. This management option is only recommended when nearly the entire waterbody is infested, and harvesting is needed to open navigation channels through the infested areas.

Benthic Barriers:

When a small infestation of exotic aquatic plants occurs in clusters of growth (generally areas $>5 \text{ ft}^2$), as opposed to scattered stems, a permeable fiberglass screen can be placed over the area of infested lake sediments. The permeable fabric screening allows for gas release from the sediments while effectively blocking sunlight and compressing the plants into the sediment, inhibiting photosynthesis and eventually killing the plant. Occasionally, in some lakes, gas release from the sediments or boating activity cause the uplifting of screening. Benthic barriers can effectively control small infestations of less than approximately 1000 square feet.

Benthic barriers have two basic applications. These practices are used to cover pioneering infestations and prevent the spread of the plant. Bottom barriers are installed across small portions of lake bottoms infested with invasive aquatic plants. The disadvantage of benthic barriers is their non-selectivity and limitation of cover to less than 10,000 sq. ft.. Additionally, these physical barriers prevent the growth of all vegetation, which is a necessary component of fish and wildlife habitat.

Bottom barriers are attached to the bottom of a water body by re-bar attached to the edges and across the middle of the material. Bottom barriers are transported to the shoreline adjacent to where installation is to occur. They are then cut to fit the treatment site and rolled onto a length of pipe. Divers carry the roll into the water at the start of the treatment site and secure one edge of the material to the lake bottom. The divers then roll out the remainder of the material and continue to secure it to the bottom sediments. This process is repeated until the plants in the treatment are covered.

Bottom barriers are generally considered for small localized areas rather than lakewide application. Bottom barriers provide 100% control of this weed in areas where they are installed. They also provide long-term control. An ongoing maintenance operation is required to inspect the bottom barrier and clear the mats of sediment buildup.


Benthic barriers are not recommended for application in river systems, as flow can easily uplift the barrier.

Targeted Application of Herbicides:

The use of chemicals, such as herbicides, for the control of noxious and

nuisance plant species represents one of the most widely known and effective management options available. Herbicide control of invasive aquatic plants is often the first step in a long-term integrated control program. In the last 15 to 20 years the use and review of herbicides has changed significantly in order to accommodate safety, health, and environmental concerns. Currently no herbicide product can be labeled for aquatic use if it has more than a one in a million chance of causing significant harmful effects to human health, wildlife, or the environment. Because of this, the number of effective and U.S. Environmental Protection Agency (EPA) approved herbicides for aquatic weeds are limited. In most cases the cost and time of testing and registration, rather than environmental issues, limits the number of potentially effective compounds.

All herbicide applications in New Hampshire are performed under permits issued by the New Hampshire Department of Agriculture, Division of Markets and Food, Bureau of Pesticide Control.

Two herbicides have been used in New Hampshire for the control of variable milfoil. Diquat (trade name Reward), the most often-used herbicide, is a contact herbicide that can provide one to two seasons of control for milfoil. Because this herbicide does not target the root systems,  plants eventually re-grow from established roots.

The second herbicide, 2, 4-D (trade name Navigate), is a systemic herbicide. It is absorbed into the sediments and taken up through the root system, killing both the roots and the plant biomass above the sediments. Label restrictions for aquatic application currently limit its use in New Hampshire to waterbodies with no water intakes, and with no wells adjacent to the shoreline.

The aquatic herbicide SONAR, has been used in New Hampshire to control growths of fanwort. The chemical acts by limiting photosynthesis when chlorophyll-a is affected by the active ingredient of the herbicide.

Extended Drawdown:

Water drawdown is used for control of some species of aquatic macrophytes. Drawdown requires some type of mechanism to lower water levels, such as dams or water control structures and use is thus limited. It is most effective when the drawdown depth exceeds the depth or invasion level of the target plant species.

In northern areas, drawdown will result in plant and root freezing during the winter for an added degree of control. Drawdown is typically inexpensive and has intermediate effects (2 or more years). However, drawdown can have other environmental effects and interfere with other functions of the water body (e.g. drinking water, recreation, or aesthetics). Drawdown can result in the rapid spread of highly opportunistic annual weed species, which in most cases is the plant that is targeted for control.

Drawdowns have been used in the past for plant control. In theory, the drying of the plants in the summer, or the freezing of the plants in the winter, will eliminate or limit plant growth. However, milfoil often forms a more succulent terrestrial form during drawdown conditions and the succulent form of the plant can remain viable for long periods of time without submergence, making the practice ineffective. This strategy can be used for control of some native plant species.

Dredging

Dredging is a means of physical removal of aquatic plants from the bottom sediments using a floating or land-based dredge. Dredging can create a variety of depth gradients creating multiple plant environments allowing for greater diversity in lakes plant, fish, and wildlife communities. However due to the cost, potential environmental effects, and the problem of sediment disposal, dredging is rarely used for control of aquatic vegetation alone.



Biological Control:

There are no approved biological controls for submersed exotic aquatic plant at that time in New Hampshire.

Appendix Eight

Program Expenditures

Summary of SFY 2004 revenues and expenditures for 1430 by Class and program (letter code)

	Clean Lakes	Exotics Control	Exotics Prevention	Totals
	(L)	(M)	(P)	
<i>Revenue from boat registrations</i>				
fee (\$/boat)	\$0.50	\$1.50	\$3.00	\$5.00
Income	\$53,995.00	\$161,985.00	\$321,722.00	\$537,702.00
EXPENSES				
1. Personnel & related costs				
10-full-time salary	\$17,617.35	\$18,131.71	\$3,166.50	\$38,915.56
18-overtime	\$916.84	\$2,728.21	\$4,084.90	\$7,729.95
22-rental prop	\$8,672.00			\$8,672.00
26-membership fees	\$200.00			\$200.00
28-rent	\$544.07	\$830.67	\$544.07	\$1,918.81
40-indirect costs		\$3,237.00		\$3,237.00
49-DAS, Sec, EAP	\$4,790.10	\$249.79	\$1,614.00	\$6,653.89
50-intern salary	\$6,928.55	\$6,155.65		\$13,084.20
60-staff/intern benefits	\$9,084.25	\$10,231.41	\$2,425.49	\$21,741.15
70-in-state travel	\$1,396.59	\$1,529.62		\$2,926.21
80-out-of-state travel	\$1,081.00	\$1,778.90		\$2,859.90
Total	\$51,230.75	\$44,872.96	\$11,834.96	\$107,938.67
2. Lab/field/outreach materials				
20-supplies	\$5,911.67	\$11,688.03	\$115.40	\$17,715.10
30-equipment	\$699.98	\$1,112.00		\$1,811.98
49-lab analysis		\$1,386.00		\$1,386.00
Total	\$6,611.65	\$14,186.03	\$115.40	\$20,913.08
3. Pass through by contracts				
90-contracts	\$0.00	\$67,819.07	\$160,947.29	\$228,766.36
Total Expenses	\$57,842.40	\$126,878.06	\$172,897.65	\$357,618.11
Ratios program category:total expenses (%)				
Personnel	89%	35%	7%	30%
Lab/field/outreach	11%	11%	0%	6%
Pass through	0%	53%	93%	64%

Summary of SFY 2005 revenues and expenditures for 1430 by Class and program (letter code)

	Clean Lakes	Exotics Control	Exotics Prevention	Totals
	(L)	(M)	(P)	
<i>Revenue from boat registrations</i>				
fee (\$/boat)	\$0.50	\$1.50	\$3.00	\$5.00
Income	\$50,439.00	\$151,189.50	\$304,641.00	\$506,269.50
EXPENSES				
1. Personnel & related costs				
10-full-time salary	\$4,749.75	\$3,166.50	\$41,996.40	\$49,912.65
18-overtime	\$1,304.01	\$3,349.74	\$4,337.05	\$8,990.80
22-rental prop	\$6,504.00	\$6,504.00		\$13,008.00
26-membership fees	\$100.00	\$180.00		\$280.00
28-rent	\$986.26	\$1,033.16		\$2,019.42
40-indirect costs	\$1,695.00			\$1,695.00
49-DAS, Sec, EAP	\$3,389.74	\$2,722.15	\$452.11	\$6,564.00
50-intern salary	\$7,174.18	\$5,463.23		\$12,637.41
60-staff/intern benefits	\$2,485.83	\$2,411.75	\$27,149.77	\$32,047.35
70-in-state travel	\$4,525.10	\$474.90		\$5,000.00
80-out-of-state travel	\$2,408.44	\$2,938.92		\$5,347.36
Total	\$35,322.31	\$28,244.35	\$73,935.33	\$137,501.99
2. Lab/field/outreach materials				
20-supplies	\$5,089.73	\$18,861.18	\$2,137.65	\$26,088.56
30-equipment		\$2,023.49	\$2,674.95	\$4,698.44
49-lab analysis		\$1,500.00		\$1,500.00
Total	\$5,089.73	\$22,384.67	\$4,812.60	\$32,287.00
3. Pass through by contracts				
90-contracts	\$0.00	\$56,152.07	\$250,177.14	\$306,329.21
Total Expenses	\$40,412.04	\$106,781.09	\$328,925.07	\$476,118.20
Ratios program category:total expenses (%)				
Personnel	87%	26%	22%	29%
Lab/field/outreach	13%	21%	1%	7%
Pass through	0%	53%	76%	64%

Appendix Nine
NHDES Exotic Aquatic Plant Program
Control Grant Rating Worksheet

**Priority Rating Worksheets for Awarding Matching Grants
for Exotic Plant Control Under RSA 487:18**

LAKE		SITE											
TOWN	APPLICANT		PRIORITY POINTS										
PUBLIC ACCESS <table border="1"> <thead> <tr> <th>Description</th> <th>Priority points</th> </tr> </thead> <tbody> <tr> <td>Private pond</td> <td>0</td> </tr> <tr> <td>Public waters but no known public access</td> <td>1</td> </tr> <tr> <td>Public waters; public access is open land or beach but not a public boat ramp</td> <td>2</td> </tr> <tr> <td>Public waters; public boat ramp present</td> <td>3</td> </tr> </tbody> </table>			Description	Priority points	Private pond	0	Public waters but no known public access	1	Public waters; public access is open land or beach but not a public boat ramp	2	Public waters; public boat ramp present	3	
Description	Priority points												
Private pond	0												
Public waters but no known public access	1												
Public waters; public access is open land or beach but not a public boat ramp	2												
Public waters; public boat ramp present	3												
			X2 =										
LAKE USE <table border="1"> <thead> <tr> <th>Description</th> <th>Priority points</th> </tr> </thead> <tbody> <tr> <td>Few or no cottages; little or no transient use</td> <td>0</td> </tr> <tr> <td>Mostly residential use; mostly smaller boats and canoes</td> <td>1</td> </tr> <tr> <td>Both residential and transient use; larger boats</td> <td>2</td> </tr> <tr> <td>Public water supply</td> <td>3</td> </tr> </tbody> </table>			Description	Priority points	Few or no cottages; little or no transient use	0	Mostly residential use; mostly smaller boats and canoes	1	Both residential and transient use; larger boats	2	Public water supply	3	
Description	Priority points												
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			X2 =										
TYPE OF INFESTATION <table border="1"> <thead> <tr> <th>Description</th> <th>Priority points</th> </tr> </thead> <tbody> <tr> <td>In flowing waters</td> <td>0</td> </tr> <tr> <td>Widespread and well established in lake/pond</td> <td>1</td> </tr> <tr> <td>Established in pond but spreading into new areas</td> <td>2</td> </tr> <tr> <td>Infestations have remained small or localized in pond</td> <td>3</td> </tr> </tbody> </table>			Description	Priority points	In flowing waters	0	Widespread and well established in lake/pond	1	Established in pond but spreading into new areas	2	Infestations have remained small or localized in pond	3	
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In flowing waters	0												
Widespread and well established in lake/pond	1												
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Infestations have remained small or localized in pond	3												

IMPACT OF INFESTATION												
<table border="1"> <tr> <th>Description</th> <th>Priority points</th> </tr> <tr> <td>Mostly in non-developed area – little cultural impact</td> <td>0</td> </tr> <tr> <td>Mostly residential impacts</td> <td>1</td> </tr> <tr> <td>Impacts to public boat access or beach as well as to residents</td> <td>2</td> </tr> <tr> <td>Impacts to commercial operations (marinas, state beach, motel/restaurant beaches/docks)</td> <td>3</td> </tr> </table>		Description	Priority points	Mostly in non-developed area – little cultural impact	0	Mostly residential impacts	1	Impacts to public boat access or beach as well as to residents	2	Impacts to commercial operations (marinas, state beach, motel/restaurant beaches/docks)	3	
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Mostly in non-developed area – little cultural impact	0											
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TREATMENT TYPE												
<table border="1"> <tr> <th>Description</th> <th>Priority points</th> </tr> <tr> <td>Herbicide only</td> <td>0</td> </tr> <tr> <td>Herbicide followed by non-chemical maintenance efforts (hand pulling, diving, etc)</td> <td>1</td> </tr> <tr> <td>Non-herbicide treatment (harvesting, barrier screens,etc)</td> <td>2</td> </tr> <tr> <td>New innovative approach</td> <td>3</td> </tr> </table>		Description	Priority points	Herbicide only	0	Herbicide followed by non-chemical maintenance efforts (hand pulling, diving, etc)	1	Non-herbicide treatment (harvesting, barrier screens,etc)	2	New innovative approach	3	
Description	Priority points											
Herbicide only	0											
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TREATMENT HISTORY												
<table border="1"> <tr> <th>Description</th> <th>Priority points</th> </tr> <tr> <td>Treated within last two years</td> <td>0</td> </tr> <tr> <td>Not treated within last two years and no request for funds</td> <td>1</td> </tr> <tr> <td>Not treated within last two years; funds requested but not available</td> <td>2</td> </tr> <tr> <td>Site not previously treated</td> <td>3</td> </tr> </table>		Description	Priority points	Treated within last two years	0	Not treated within last two years and no request for funds	1	Not treated within last two years; funds requested but not available	2	Site not previously treated	3	
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Treated within last two years	0											
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LOCAL SUPPORT												
<table border="1"> <tr> <th>Description</th> <th>Priority points</th> </tr> <tr> <td>Propose to provide minimum 50 % match</td> <td>0</td> </tr> <tr> <td>Provide 65% match</td> <td>1</td> </tr> <tr> <td>Provide 80% match</td> <td>2</td> </tr> <tr> <td>Provide 90% match</td> <td>3</td> </tr> </table>		Description	Priority points	Propose to provide minimum 50 % match	0	Provide 65% match	1	Provide 80% match	2	Provide 90% match	3	
Description	Priority points											
Propose to provide minimum 50 % match	0											
Provide 65% match	1											
Provide 80% match	2											
Provide 90% match	3											
TOTAL POINTS												

§ 487:18 Project Prioritization. – Project approval shall be based upon prioritization factors to be established by rules adopted under RSA 541-A. Such rules shall give first priority for expenditure of available funds to the eradication of new infestations of exotic aquatic weeds pursuant to RSA 487:17, II(b) and second priority to all reasonable measures to control exotic aquatic weeds. Otherwise, preference shall be given to lakes that have public access or that serve as a public drinking water supply. Implementation measures shall be based upon an assessment of potential success, technical feasibility, practicability, and cost effectiveness. Restoration and preservation projects shall include watershed management plans to control and reduce incoming nutrients wherever possible through best management practices. Repeated short-term solutions shall be discouraged where long-term solutions are feasible and cost effective. Treatments shall be designed to minimize any adverse effect upon fish and wildlife, their habitats, and the environment.

Source. 1990, 143:2, eff. June 18, 1990.